THE

AMERICAN GAS-LIGHT JOURNAL.

THE OFFICIAL GAZETTE OF

LIGHT, HEAT, WATER-SUPPLY, AND SEWERAGE.

Rooms—No. 39 Nassau Street, cor. Liberty Street, opposite the Post-Office, New York.

VOL. III.—No. 41. NEW-YORK, MONDAY, SEPTEMBER 2, 1861. $3 PER ANNUM.

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See engravings on page 148, vol. II.

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For engravings, see American Gas-Light Journal for June, 1860, page 245. Address the Patentee. JOHN P. KENNEDY, Trenton, N. J.

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See Engravings in American Gas-Light Journal for July 1, 1860, page 280.

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Cheshire,
Ganges,
Gun Marsh,
Hopkins,
Lake,
Leighton,
Manlius,
Martin,
Monterey,
New Casco,
Otsego,
Overisel,
Pine Plain,
Plainwell.
Proctor,
Saugatuck,
Silver Creek,
Wayland.

Alpena County.

Alpena.

Arenac County.

Arenac.

Antrim County.

Elk Rapids.

Barry County.

Assyria,
Baltimore,
Barryville,
Bristolville,
Carlton,
Cedar Creek,
Glass Creek,
Gun Lake,
Hastings, (c. h.)
Hickory Corners,
Irving,
Johnstown,
Maple Grove,
Merritt,
Middleville,
Milo,
North Irvin,
Orangeville Mills,
Prairieville,
South Assyria,
Woodland,
Yankee Spring.

Berrien County.

Bainbridge,
Berrien Centre,
Berrien Spring (c.h.)
Bertrand,
Buchanan,
Coloma,
Dayton,
Galien,
Millburgh,
New Buffalo,
Niles,
Pipestone,
Saint Joseph,
Three Oaks,
Watervliet,
Weesaw.

Branch County.

Algansee,
Batavia,
Bethel,
Branch, (c. h.)
Bronson's Prairie,
Butler,
California,
Cold Water, (c. h.)
East Gilead,
Gilead,
Girard,
Kinderhook,
Mattison,
Noble Centre,
Round Lake,
Quincy,
Sherwood,
Union City.

Calhoun County.

Albion,
Athens,
Battle Creek,
Bedford,
Burlington,
Cedar Lake,
Ceresco,
Clarence,
Clarendon,
Clarendon Centre,
Convis,
Convis Centre,
East Leroy,
Emmett,
Homer,
Lyon Lake,
Marengo,
Marshall, (c. h.)
Newton,
Partello,
Penfield,
Pine Creek,
Secillia,
Tekonsha,
West Leroy.

Cass County.

Adamsville,
Brownsville,
Cassapolis,
Dowagiac,
Edwardsburgh,
La Grange,
Liberty Church,
Little Prairie Ronde,
Marcellus,
Newberg,
Picket's Corner,
Pokagon,
Shave Head,
Summerville,
Union,
Vandalia,
Williamsville.

Cheboygan County.

Duncan.

Chippewa County.

Sault de St. Marie,
Sugar Island.

Clinton County.

Bath,
Bengal,
Dallas,
De Witt,
Duplain,
Eagle,
Elsie,
Essex,
Geary,
Goss,
Greenbush,
Keystone,
Maple Rapids,
North Eagle,
Olive,
Ovid,
Ovid Centre,
Riley,
Saint Johns,
South Riley,
Victor,
Wacousta,
Westphalia.

Delta County.

Cedar Fork,
Esconawba.

Eaton County.

Belleview,
Brookfield,
Camp Creek,
Carlisle,
Centre,
Charlotte,
Chester,
Delta,
Eaton Rapids,
Elmira,
Grand Ledge,
Kalamo,
Mud Creek,
Olivet,
Oneida,
Roxana,
South Sunfield,
Sunfield,
Vermontville,
West Benton,
West Windsor,
Windsor.

Emmet County.

Bear River,
Charlevoix,
Saint James.

Genesee County.

Argentine,
Atlas,
Crockersville,
Davison Centre,
East Thetford,
Elgin,
Elk,
Fentonville,
Flint,
Flushing,
Forest,
Gaines,
Gaines' Station,
Genessee Village,
Goodrich,
Grand Blanc,
Kearsley,
Linden,
Montrose,
Mount Morris,
Mundy,
Pine Run,
Richfield,
Stony Run,
Swurtz Creek,
Thetford,
Valeria.

Grand Traverse County.

Grand Traverse,
Mapleton,
Omena,
Traverse City,
White Water.

Gratiot County.

Alma,
Elm Hall,
Forest Hill,
Ithaca,
La Fayette,
Monticello,
Newark,
North Star,
North Shade,
Pompei,
Saint Louis,
Stella,
Spring Brook.

Hillsdale County.

Amboy,
Cambria Mills,
Camden,
Cass,
Edinburgh,
Florida,
Hillsdale,
Jefferson,
Jonesville,
Litchfield,
Morganville,
Moscow,
Mosherville,
North Adams,
Ransom,
Reading,
Somerset,
Sparta,
South Wright,
Sylvanus,
Wheatland Centre,
Wood's Corners.

Houghton County.

Algonquin,
Clifton,
Eagle Harbor,
Eagle River,
Fort Wilkins,
Houghton,
Kewenaw Bay,
North West Mine.

Huron County.

Barnettsville,
Port Austin,
White Rock,
Willow Creek.

Ingham County.

Alverson,
Aurelius,
Bunker Hill,
Dansville,
Delhi Centre,
Eden,
Felt's,
Fitchburg,
Lansing,
Le Roy,
Leslie,
Mason,
North Aurelius,
Norton,
Onondaga,
Phelpstown,
Red Bridge,
Sanford,
Stockbridge,
White Oak,
Williamstown,
West Delhi,

Ionia County.

Avon,
Boston,
Campbell,
Danby,
Ionia, (c. h.)
Kiddville,
Kossuth,
Lake City,
Lyons,
Maple,
Matherton,
Muir,
North Plains,
Orange,
Otisco,
Palo,
Patterson's Mills,
Pewamo,
Plains,
Portland,
Rix,
Ronald Centre,
Saranac,
Sebewa,
Smyrna,
South Boston,
South Cass,
Wheatland.

Isabella County.

Albany,
Salt River,
Wiota.

Jackson County.

Arland,
Baldwin's Mills,
Barry,
Brooklyn,
Cayuga,
Columbia,
Concord,
Franciscoville,
Gidley's Station,
Grass Lake,
Hanover,
Henrietta,
Jackson,
Leoni,
Liberty,
Michigan Centre,
Napoleon,
Norvell,
Otter Creek,
Portage Lake,
Pulaski,
South Henrietta,
South Jackson,
Spring Arbor,
Springport,
Tompkins,
Waterloo,
West Rives.

Josco County.

Ausable,
Tawas City.

Kalamazoo County.

Alamo,
Brady,
Charleston,
Climax Prairie,
Comstock.
Cooper,
Galesburgh,
Kalamazoo, (c. h.)
Oshtemo,
Pavilion,
Portgage,
Prairie Ronde,
Richland,
Schoolcraft,
Wakeshma,
West Climax,
Yorkville.

Kent County.

Ada,
Algoma,
Alto,
Alton,
Ashley,
Austerlitz,
Bowne,
Braceville,
Buck Creek,
Caledonia,
Cannonsburgh,
Cascade,
Cedar Springs,
Cortlandt,
Cortlandt Centre,
Cuba,
Englishville,
Erin,
Fallassburgh,
Flat River,
Gainesville,
Grahamville,
Grand Rapids,
Grandville,
Grattan,
Indian Creek,
Kelloggsville,
Laphamsville,
Loomisville,
Lowell,
Nelson,
North Brownville,
Oakfield,
Pleasant,
Sparta Centre,
Spencer's Mill,
Vergennes,
White Swan,
Whitneyville.

Lapeer County.

Allison,
Almont,
Arcadia,
Columbiaville,
Dryden,
Farmer's Creek,
Goodland,
Hadley,
Hunter's Creek,
Imlay,
Lapeer, (c. h.)
Marathon,
Metamora,
North Branch,
Pool,
Thornville,
Whigville.

Leelenau County.

Leland,
Northport,
North Unity.

Lenawee County.

Addison,
Adrian,
Attica,
Blissfield,
Cambridge,
Canandaigua,
Clayton,
Clinton,
Deerfield,
Dover,
East Ogden,
Fairfield,
Geneva,
Hudson,
Lake Ridge,
Macon,
Medina,
Morenci,
North Adrian,
Oakford,
Palmyra,
Ridgeway,
Riga,
Rollin,
Rome,
Seneca,
Springville,
Tecumseh, (c. h.)
Tipton,
Wellsville,
West Ogden,
Woodstock,
Wolf Creek.

Livingston County.

Brighton,
Cohoctah,
Conway,
Deer Creek,
Fleming,
Fowlerville,
Genoa,
Green Oak,
Hamburgh,
Hamburgh Village,
Hartland,
Hollister,
Howell, (c. h.)
Josco,
Madison,
Marion,
Middletown,
North Brighton,
Oak Grove,
Osceola Centre,
Parshallville,
Pinckney,
Plainfield,
Tyrone,
Unadilla.

Macomb County.

Armada,
Disco,
East Union,
Lenox,
Macomb,
Memphis,
Mere,
Milton,
Mount Clemens, (c h)
Mount Vernon,
New Baltimore,
New Haven,
Plumb Brook,
Ray,
Ray Centre,
Red Run,
Richmond,
Romeo,
Roseville,
Scottsville,
Utica,
Vienna,
Warren,
Washington.

Manistee County.

Manistee,
Portage Creek.

Marquette County.

Marquette,
Negaunee.

Mason County.

Freeman's Mills,
Little Sauble,
Pere Marquette.

Mecosta County.

Grove,
Leonard,
Pierson.

Mitchillimackinac County.

Mackinac, (c. h.)

Midland County.

Midland.

Monroe County.

Brest,
Clark City,
Dundee,
East Raisinville,
Erie,
Exeter,
Grafton,
Ida,
Lambertville,
La Salle,
London,
Milan,
Monroe, (c. h.)
Newport,
North Raisinville,
Oakville,
Ottawa Lake,
Summerfield.

Montcalm County.

Bloomer Centre,
Bushnell Centre,
Cato,
Clear Lake,
Crystal,
Fair Plains,
Greenville,
Montcalm,
West Bloomer.

Newaygo County.

Ashland,
Big Prairie,
Bridgeton,
Croton,
Newaygo,
Weaversville.

Oakland County.

Auburn,
Austin,
Ball Mountain,
Big Beaver,
Birmingham,
Brandon,
Clarkston,
Commerce,
Davisburgh,
Drayton Plains,
Farmington,
Four Towns,
Franklin,
Gilbert,
Groveland,
Highland,
Holly Mills,
Jersey,
Kensington,
Lakeville,
Mahopac,
Milford,
Mount Pleasant,
New Hudson,
North Farmington,
North Oxford,
Novi,
Oakland,
Oakwood,
Orion,
Ortonville,
Oxford,
Pontiac,
Rochester,
Rose,
Royal Oak,
Southfield,
South Lyon,
Springfield,
Springs Mills,
Strait's Lake,
Summit,
Troy,
Walled Lake,
Waterford,
West Bloomfield,
West Novi,
White Lake.

Oceana County.

Clay Banks,
Benona,
Greenwood,
Marr,
Pent Water,
White River.

Ontonagon County.

Adventure,
Greenland,
Minnesota Mine,
Ontonagon,
Pewabic,
Rockland.

Ottawa County.

Allendale,
Berlin,
Big Spring,
Casnovia,
Coopersville,
Crimea,
Dalton's Mills,
Day,
Eastmansville,
East Muskegon,
Forest City,
Georgetown,
Grand Haven,
Holland,
Jamestown,
Lamont,
Mill Point,
Muskegon,
Ottawa Centre,
Pintler's Corners,
Ravenna,
Robinson,
Sebastopol,
Six Corners,
Tallmadge,
Wright,
Zealand.

Saginaw County.

Bay City,
Birch Run,
Blumfield,
Bridgeport,
Bridgeport Centre,
Chesaning,
East Saginaw,
Frankenlust,
Fraukenmuth,
Jay,
Mickleville,
Portsmouth,
Saginaw,
Saint Charles,
Taymouth,
Tittabawasee,
Zilwaukee.

Saint Clair County.

Algonac,
Belle River,
Brockway,
Campbellton,
Capac,
Casco,
China,
Clyde Mills,
Columbus,
Cottrellville,
Kenockee,
Lake Port,
Lynn,
Marysville,
Merrillsville,
Port Huron,
Pottersburgh,
Ruby,
Saint Clair, (c. h.)
Swan Creek,
Tara's Hall,
Thornton,
Wales,
West Berlin.

Saint Joseph's County.

Burr Oak,
Centreville, (c. h.)
Colon,
Constantine,
Fawn River,
Florence,
Flowerfield,
Howardsville,
Leonidas,
Mill Creek,
Mottville,
Nottawa,
Oporto,
Park,
Parkville,
Sturgis,
Three Rivers,
White Pigeon,

Sanilac County.

Buel,
Davisville,
Farmer's
Forest Bay,
Forestville,
Forrester,
Lexington,
Peck,
Port Sanilac,
Sanilac Mills,
Stevens' Landing.

Shiawasse County.

Antrim,
Bennington,
Burns,
Byron,
Corunna,
Enterprise,
Fremont,
Hartwellville,
Hazleton,
Maple Valley,
Middleburgh,
Nebraska,
North Vernon,
Owasso,
Perry,
Pittsburgh,
Shiawasseetown,
Vernon,
West Haven,
Wheelerville,
Woodhull.

Tuscola County.

Akron,
East Dayton,
Fair Grove,
Millington,
Pine Grove,
Sibbiwaing,
Wahjamega,
Vasser,
Watrousville,
Worth.

Van Buren County.

Arlington,
Bloomingdale,
Breedsville,
Brewerville,
Decatur,
Hamilton,
Hartford,
Hunter,
Keelersville,
Lake Mill,
Lawrence,
Lawton,
Mattawan,
Paw Paw,
Porter,
Prospect Lake,
Saint Paul,
South Haven,
Waverly.

Washtenaw County.

Ann Arbor,
Base Lake,
Benton,
Bridgewater,
Chelsea,
Dexter,
Fredonia,
Gravel Run,
Iron Creek,
Lima,
Lodi,
Manchester,
Paint Creek,
Salem,
Saline,
Scio,
Superior,
Sylvan,
Union District,
Webster,
Whitmore Lake,
York,
Ypsilanti.

Wayne County.

Belleville,
Borodino,
Brownstown,
Connor's Creek,
Dearbonville,
Detroit, (c. h.)
East Nankin,
Ecorce,
Elm,
Gibraltar,
Greenfield,
Grosse Isle,
Huron,
Livonia Centre,
Mead's Mills,
Moulin Ridge,
Nankin,
Northville,
Oak,
Plank Road,
Plymouth,
Rawsonville,
Redford,
Romulus,
Smithville,
South Plymouth,
Trenton,
Wayne,
Wyandotte.

WATER-WORKS OF AMERICA.

TROY, N. Y.

REPORT FOR THE YEAR ENDING MARCH 5, 1861.

The amount of rents for the water rent year, commencing May 1, 1860, assessed on premises liable to rent, and payable into the chamberlain's office, at the same time as the annual city taxes on such premises, and as a part thereof, was—

In First District	5,178 52	
In Second District	3,001 69	
In Third District	10,304 40	
		$18,479 61

Increase over the year 1859.....$516 73.

In addition to the assessed water rent, receivable in the chamberlain's office, the clerk has received in the water-works office, during the year, and paid to the chamberlain, the sum of $4,122 90 from these sources, viz.:

For special rates on seminary, schools, churches, jail, etc	339 50	
For mason uses, erecting buildings	425 41	
For four quarters' rent of tenant-house at reservoir	50 00	
For street sprinkling with small hose	20 50	
For job work, and pipe sold	3,287 49	
		4,122 90
Total income for the year		$22,602 51

The receipts in the office, by the clerk, were $1,682 07 less than the previous year; for the reason that no permits for street sprinkling, because of the short supply of water, were issued, except to a small amount, in September; and that the job-work, which varies materially from year to year, was less. As job work is done at cost, of course the expenses for labor, lead pipe and iron pipe were much less than the previous year.

EXPENDITURES FOR THE YEAR 1860.

These are embraced under the following heads:

Interest on Water-Works debt	4,059 06
Monthly pay-roll, including clerk's salary	3,270 17
Superintendent's salary	700 00
Lead pipe	866 01
Surveys and maps	225 00
Work and materials, in part, on construction	8,883 74
Iron pipe for laterals	102 00
Brass castings, $106 20; iron castings, $111 08	217 28
Stop-cocks, $220; hydrant posts, $55	275 00
Hardware	202 92
Force-pump, near State Dam	800 00
Rent of building and water-power for pump, 6 months	500 00
Ground rent and release thereof, on lake in Brunswick	369 00
Cleaning reservoir and fire-dam	323 75
Printing annual reports and advertising	69 33
Blacksmithing, $77 02; anthracite coal, $42 25	119 27
Lumber, $90 96; old metal, $76 12	167 08
Charcoal, $46 95; Straw, $23 66	70 61
Taxes on property in Brunswick	43 81
Team work and horse hire	50 05
Freight, $15 50; paint and oil, $22 85	38 35
Rent of barn for storage	31 50
Stebbin's patent draught-cocks	69 15
Water-gauge, $26 31; stone, $24 75	51 06
Carpenter's work	73 37
All other expenses, contingent	81 70
Total expenditures	$21,659 21

The income, it will be seen, exceeds the expenditures $943 30; leaving this amount of the year's income unexpended, in the chamberlain's office, to the credit of the works.

The expenditures are thus classified:

For interest, salaries, labor, materials, six months' rent of power for pump, and all ordinary expenses of the works	11,518 41
For construction	10,140 80
	$21,659 21

This reservoir dam, which was commenced under contract in September, 1859, the contractor failed to finish at the time limited, and after settlement with him, it was directed that the dam be finished under the charge of the superintendent.

There was expended upon this reservoir for land, surveys, and labor, the previous year, to March 1, 1860, the sum of	6,652 82
Add the expenditures of this year	9,016 61
Total cost thus far	$15,669 43

There is due for land to Robert P. Winne, four hundred dollars, for which he holds a city bond, at six per cent., to be paid whenever he removes the incumbrance and gives a clear title. This sum, together with the expense of fencing the reservoir, which has not yet been done, will make the total cost something more than $16,000.

COMPARATIVE STATEMENTS OF RECEIPTS AND EXPENDITURES FOR SIX YEARS.

The Water-Works have been under the charge of the present officials for six years. During these six years the receipts and expenditures have been thus:

	Assessed Rents payable to the Chamberlain.	Paid to Chamberlain by the Clerk.	Total Receipts.	
1855	15,324 60	5,520 94	20,845 54	
1856	16,005 57	5,169 16	21,174 73	
1857	16,898 47	5,043 19	21,941 66	
1858	17,131 11	4,770 66	21,901 77	
1859	17,962 88	5,807 97	23,770 85	
1860	18,479 61	4,122 90	22,602 51	
Total receipts				132,237 06

	Paid for Interest and Ordinary Expenses.	Paid for Construction.	Total Expenditures.	
1855	12,511 38	0,000 00	12,511 38	
1856	12,124 59	8,868 69	20,993 28	
1857	11,978 86	11,855 08	23,833 94	
1858	10,857 36	11,484 69	22,342 05	
1859	12,141 31	8,783 43	20,924 74	
1860	11,518 41	10,140 80	21,659 21	
Total expenditures				122.264 60
Balance of six years earnings, in chamberlain's office unexpended				$9,972 46

It will be seen that the water rents, assessed, have increased each year, owing to new buildings, new uses, and chiefly to the extension of street mains.

The payments for interest, salaries, labor, materials, and all ordinary expenses of maintaining the works during these six years were	71,131 91	
Surplus earnings during the same time	61,105 15	
		$132,237 06

Of these surplus earnings there has been expended:

For new reservoir	15,669 43
For force-pump	1,062 18
For iron pipe and street mains	34,401 08
Expended	51,132 69
In chamberlain's office unexpended	9,973 46
	$61,105 15

STREET MAINS LAID.

The street mains laid in six years, consist of:

325 feet 3-inch pipe.
2,642 feet 4-inch pipe.
821 feet 6-inch pipe.
5,075 feet 8-inch pipe.
4,022 feet 20-inch pipe.

12,885 feet, equal to 2 miles 2,325 feet, nearly 2½ miles.
19 stop-cocks, of different sizes.
16 fire plugs.

COST OF THE WATER-WORKS.

The entire cost, to March, 1860, was	215,991 89
Add for construction this year	10,140 80
Total cost of construction to March, 1861	$226,132 69

WATER-WORKS DEBT.

This debt, in 1855, when the present officials took charge of the works, was $100,000. There was paid upon it in May, 1857, $10,000; in May, 1860, $10,000, and $9,000 of the bonds, held by the Commissioners of the Sinking Fund, cancelled. The money for these payments was raised $2,500 a year in the taxes, as provided by law, for a sinking fund, and from the rent of the Female Seminary.

There remains due.....$71,000 00

This is payable:

May 1, 1863	10,000 00
May 1, 1866	10,000 00
May 1, 1869	10,000 00
May 1, 1872	6,000 00
May 1, 1875	15,000 00
May 1, 1880	20,000 00
	$71,000 00

Interest 5 per cent., semi-annual.

THE NEW RESERVOIR.

This is situated on the Piscawen Creek, about fifty rods east of Oakwood Avenue, and about half a mile east of the Distributing Reservoir. It was commenced in September, 1859, and, as before stated, but partly finished in that year. The land purchased for its site was ten and fifty-six one hundredths acres, and when full to top-water line, the flow will be about eight acres. The water in the deepest part is thirty-five feet, and the average depth from fifteen to eighteen feet. It was finished, except the waste-wier, and this shortly thereafter, by the first of July, 1860, and will contain forty million gallons.

A full description of the manner in which the dam is built, after the most approved plan of building earth dams, was published in the last annual report, an abstract of which will be found on page 239, vol. II., of this JOURNAL.

As the water which supplied the city came from the rivulets and lakes in Brunswick and passed through the pipes in this dam, and the season remarkably dry and water low, no surplus was accumulated in this reservoir till the latter part of August, at which time it became full. From that time, during all the fall and winter, it has supplied the city, continued full, and discharged, almost daily, a surplus over the waste-wier, and this without drawing from the lakes in Brunswick. At the time of the thaw and freshet in February, the pipes in the dam, two twelve-inch and one eight-inch, and the waste-wier, a circular brick sewer four by five feet in diameter, were not sufficient to pass off the water, and it made its way over the ground on the south side of the dam. The surplus water, which thus passed off to the Hudson, during two days, was probably sufficient to fill two additional reservoirs of the size of this new one.

The capacity of the Piscawen Creek and its tributary springs and rivulets to supply the city with water can be fully and fairly tested only by building additional reservoirs as often as needed, and as long as there is surplus water to fill them.

THE FORCE-PUMP.

In the fall of 1859, seeing that the new dam would not be finished in December, at the time limited by the contract, and apprehensive that there might be a short supply of water in the spring and summer of 1860, before the dam could be completed and filled, the officials purchased twelve inch iron pipe to be used if occasion required, for a pump at the Hydraulic Canal, near the State Dam, and in the winter of 1860 made inquiries for purchasing a lot on said canal, or hiring the necessary power. It became evident in the spring of 1860—the fall, winter, and spring being very dry, and the lake in Brunswick in April not full—that a pump would be useful, perhaps absolutely necessary as an auxiliary, in providing the requisite quantity of water for the use of the city during the summer.

The delay in putting in operation the pump was caused by the Common Council withholding the appropriation till the 2d of July. As soon thereafter as could well be done, premises and water-power were engaged of the Troy Cordage Company, on the Hydraulic Canal, a pump purchased, capable of raising four hundred and fifty thousand gallons in twenty-four hours, and put in operation the 5th of August. The cost of the pump, pipe, and fixtures was $1,349 34. The annual rent of the building and power was $1,000, definitely engaged for one year from July 15th. Six months of this rent has been paid in this fiscal year. The twelve-inch pipe through which the water was forced, was connected by a branch with the original twelve inch main in River street, and the water was forced directly into the city pipes, and when these were full, the surplus into the distributing reservoir. From the 14th of August, when the rains commenced, the Piscawen Creek furnished an ample supply for the city, but the pump was kept in operation till the 10th of September, for the purpose of enabling the reservoir and fire dam to be cleaned, since which time it has not been worked.

THE STREET MAINS.

During the winter just closing, not a single instance of a break or a leak in the main pipe has occured. Such a thing in any part of the year rarely happens, and it is evident, therefore, that the mains are strong, well laid, and beyond the effect of frost.

WASTE OF WATER.

The quantity of water wasted every year is probably equal to that used for all needful purposes. This waste arises from leakage under ground, by hydrants partly worn out and neglected to be repaired, and from hydrants unnecessarily, and sometimes wantonly being left open, and the water allowed to run. The men employed on the works are directed to be watchful to detect waste, and to punish by shutting off the water; but as the number is small, they cannot, in all cases, be cognizant of a violation of the by-laws in this respect. It is expected and recommended that all takers use freely all that is necessary, and allow no waste, and doubtless if some families in some localities would use water more freely for personal and household cleanliness, their health and comfort would be greatly improved. It is unwise and unnecessary for a city to expend its thousands every few years for an increased supply, while a quantity equal to such an increase is negligently or heedlessly wasted.

WATER-METERS.

In the annual reports of water-works of other cities, complaints are made about the waste of water, and suggestions as to the necessity of some effectual means to check it. Hence, meters have been introduced in Albany, New York, Boston, Detroit, Cincinnati, etc., and applied to large establishments, and the water sold at a fixed price per one hundred or one thousand gallons. Thus, the taker, as in the case of gas, pays for what he takes. The Troy Water Commissioners have on hand one meter, to be tried the coming season, as an experiment. As at present informed, meters are not generally recommended for private dwellings. They will, evidently, however, serve the valuable purpose of aiding to equalize the price of water on breweries, hotels, livery stables, and other premises, where the use, as well as the abuse, is great.

HISTORY OF THE WATER-WORKS.

The Troy Water-Works were built in 1833, on a scale, at that time, adequate to supply the population of the city, which was about twelve thousand, and capable of enlargement, by adding new reservoirs, as population should increase and need require, to an extent not yet fully known. It appears that Troy was the second city in the United States which introduced iron pipe for street mains—Philadelphia being the first. From 1833 to 1853—twenty years—very little was done in the way of extending street pipes, or increasing the storage of water and frequently the city suffered heavy losses by fire on account of the want of water. The Water-Works were treated as finished, and considered by many, and so talked of, as a failure, attended with taxation each year to sustain them. But the Committee on Water-Works of the Common Council, in 1852 and 1853, thought differently; being satisfied that a sufficient quantity of water for the use of the city then, and for some years to come, could be supplied from the present source, if kept in store, they therefore purchased land and enlarged the upper lake in 1853. From that time till the fall of 1858—five years—there were no intimations of a short supply. But during these five years, under the operations of the new law of 1855, when every premises was required to pay rent, and almost every one had the water introduced, this change in the system, with the increase of population and new uses, probably doubled the consumption and the waste of water. Hence, with a dry season, the short supply of 1860.

The cost of the works to March, 1855, was $175,000; to March, 1861, $226,132 69—a very low figure for a city water-works, and the price of water for a premises is correspondingly low. With the works, as thus far constructed—the debt remaining unpaid, small—the facility for adding storing reservoirs on the Piscawen, great—and the Hudson river available when need requires—the city for all time to come, can be easily and cheaply supplied with abundance of water, and the citizens of Troy may well be congratulated upon these highly favorable circumstances.

BOARD OF WATER COMMISSIONERS OF TROY.

HARVEY SMITH, LIBERTY GILBERT,
WM. F. SAGE, J. M. WARREN.

GAS FROM SUPERHEATED STEAM AND COAL TAR.—It is said that superheated steam, charged with coal tar, produces, with marvellous rapidity, and at an exeedingly low price, any quantity of a very rich gas for lighting. Careful analysis shows it to be composed of free oxygen, 1-8; carbonic oxide 3; carbonic acid, 5-8; bicarburetted hydrogen 17-8, and protocarburetted hydrogen, 17-9. Compared with ordinary coal gas, this artificial gas is found to contain nearly one-half less carbonic oxide, and twice as much bicarburetted hydrogen—its intrinsic value, therefore, being twice as great. It is entirely free from sulphuretted hydrogen, and its composition proves that it is a very permanent mixture or combination, which remains intact for any distance it may be conducted.

GAS EXPLOSION IN A SEWER.—Five men recently went into the Southwark Bridge-road sewer, in London, Eng., to recover tallow which had flown into it from the great fire in Tooley street. An accumulation of gas was ignited by their candles, and violently exploded. The men were taken out, considerably injured.

ROCK OIL, ITS GEOLOGICAL RELATIONS AND DISTRIBUTION.

BY PROF. E. B. ANDREWS, MARIETTA COLLEGE, OHIO.

My investigations have been directed chiefly to the oil of the coal rocks, and I propose in this paper to give some of my results.

The surface indications of petroleum are oil and gas springs. These springs are found scattered over a very large area.

It is doubtless well known to scientific men that there are, in the West, two distinct geological formations from which petroleum or rock oil is obtained. These are the bituminous coal measures and the Portage and Chemung groups, (the Waverly sandstone of the Ohio Reports). The Portage and Chemung rocks sweep around in the form of a quadrant from northwestern Pennsylvania into southern Ohio, and south into Kentucky. Upon these rocks the famous oil regions of Pennsylvania and northeastern Ohio are located. The oil regions of western Virginia and southern Ohio, including a portion of western Pennsylvania, lie in the coal measures. Marietta, Ohio, may be regarded as near the centre of these extensive oil fields.

It is well known that in the manufacture of coal oil a large amount of vapor or gas remains uncondensed. The town of Newark, Ohio, has been lighted for several years by the surplus gas from the oil works there. While it is believed that the oil cannot be produced in the subterranean distillation without the production of gas, it is also reasonable to suppose that at the very low temperature at which this distillation must take place, the formation of gas necessarily implies the formation of more or less oil. Hence in our bituminous coal measures a gas spring doubtless indicates the existence of oil in the rocks below. The great majority of these gas springs are unknown, since they are seldom discovered, except when they appear in streams; and probably the same may be true of oil springs, since the soil would absorb the oil, and in only a few cases would it be detected. I have assumed that the oil is the product of the distillation of bituminous strata, at low temperatures. This theory, which is a modification of the old one of distillation (at high temperatures), has recently been brought forward by Prof. J. S. Newberry, and has received the sanction of many of our most eminent chemists. The chief objection to it is the fact that the coal, cannel and bituminous, in our oil regions gives no evidence of having lost any of its full and normal quantity of bitumen or hydrocarbons. For example, at Petroleum, Ritchie Co., Va., where strata have been brought up by an uplift from several hundred feet below, seams of cannel and bituminous coal appear, which, if judged by the standard of Nova Scotia or English coals, have lost none of their bituminous properties. The cannel coal, although somewhat earthy, yields from forty to sixty gallons of oil to the ton.

The other theory, that the oil was produced at the time of the original bituminization of the vegetable or animal matter, has many difficulties in its way. If the oil were formed with the bitumen of the coal, we should expect that wherever there is bituminous coal, there would be corresponding quantities of oil. This is not so in fact, for, as will be seen presently, there is no oil except in fissures in the rocks overlying the bituminous strata, and these fissures can be shown to have been made since the coal strata became bituminized. Again, upon this theory it will be difficult to explain the large quantities of inflammable gas always accompanying the oil. If it is generated exclusively from the oil, then we should expect to find the quantity of oil least where the gas springs have for ages been the most active, but at such places the oil, instead of being wasted, is the most abundant.

That the oil is accumulated in fissures in the rocks and that these fissures are more or less vertical there is abundant proof. The oil in the same neighborhood is found at very different depths. It is very seldom that two adjoining wells strike the oil at the same distance below the surface. The accompanying diagram shows the relative depths of oil wells on Burning Spring Run in Wirt Co., Va. It is evident that in this case the oil is not contained in anything like a horizontal reservoir. The famous Lewellyn well marked No. 2, struck an oil fissure at one hundred feet, while the Athens Company's well marked 8, struck a large

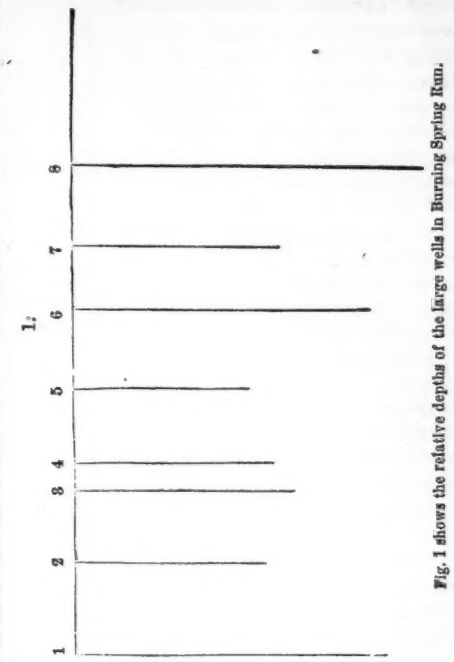


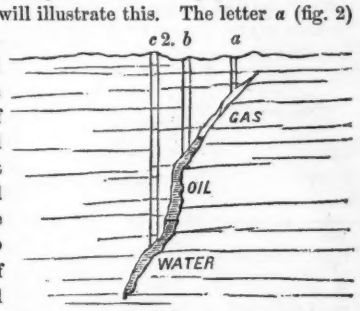
Fig. 1 shows the relative depths of the large wells in Burning Spring Run.

vein at two hundred feet. The oil in the first is said to stand at 41°, (Beaumé,) while that of the latter stands at 33°. On Duck Creek, Washington Co., Ohio, wells very near each other show a difference of ten degrees (Beaumé) in specific gravity.

At Smith's Ferry, in Western Pennsylvania, on the Ohio River, much of the oil is of a light straw color, while it is said other wells yield an oil of the more usual dark-greenish color. On the same lease of land and within six or eight rods of the well marked 8 in the previous figure, is a well two hundred and fifty feet deep. The oil from this well is not only different in its specific gravity from that in the other, but the deepest well contains fresh water, while the other contains salt water. From these and similar facts, it is evident that the oil is in distinct and separate fissures, and that these are vertical rather than horizontal.

The contents of these fissures are generally water, at the bottom, oil floating upon the water, and gas filling the space above the oil. Where the gas finds an outlet through a crevice in the overlying rocks, there is produced a gas spring. When the water finds an outlet it carries the oil with it and an oil spring is the result. I have found oil springs high up on hill sides.

An oil fissure may be struck at any point. The following figure will illustrate this. The letter *a* (fig. 2) shows the position of a well which strikes near the top of a fissure and in that part which is filled with gas. The gas rushes up but no oil. If again the well bored at *b*, it will strike oil, and the gas pent up in the upper part of the fissure will force the oil up through the well *b*. There are several oil wells on Little Kanawha in which the gas has forced up very large quantities of oil. The action of the gas, however, soon becomes fitful and intermittent. If again the well is bored at *c*, it will strike that part of the fissure which contains water. In such case oil can be obtained only by pumping out the water. Doubtless many good oil wells are thought to be worthless, and abandoned because they contain at first only water. If bored at the point *c*, in the water part of the fissure, water alone is to be expected until the pump has been used. There may be floating upon the water, higher up in the fissure, a large quantity of oil.



If the oil is found in fissures in the rocks, it is natural to suppose that in those places where the fissures are the most numerous and largest, the oil would be formed in the largest quantity. This antecedent probably is fully verified by the facts. The

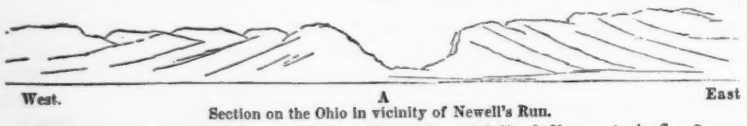
rocks of Western Virginia and Southeastern Ohio may be divided into three classes, *those which are almost entirely horizontal, those which have a dip of from fifteen to forty feet in the mile, and those which are broken and dislocated by an uplift.* The strata from the Ohio River at Parkersburg up the Little Kanawha to within a few miles of the great oil wells are very nearly horizontal and probably contain few fissures except such as may have been produced by the drying and shrinking of the rocks. There is not to my knowledge a single productive oil well in that region, although a large number of wells have been bored. The compact and unbroken clay shales and other strata rest upon the deep bituminous strata and furnish no spaces through which the oil vapor could rise. Probably no such vapor is formed.

On the Great Kanawha River, at Pomeroy, and vicinity on the Ohio River, in Athens, Morgan, Noble, Washington, and other counties in Ohio, located on the coal measures, the rocks have more or less dip, and contain, as a probable result of the uplifting force, many fissures. These counties all furnish oil—Noble and Washington in considerable quantities. The salt wells on Great Kanawha, at Pomeroy on the Ohio, on the Hocking and Muskingum Rivers, and on Duck Creek, revealed more or less oil.

But it is in regions where the strata have been the most disturbed and where the fissures are the most numerous, that the most oil is found.

I have recently traced a most interesting line of uplift and dislocation from the eastern part of Washington county, Ohio, to beyond the great oil wells on the Little Kanawha River. The direction of it is nearly north and south. It makes an angle of about 40° with the general course of the Alleghany Mountains. As seen in Ohio it presents a well marked anticlinal axis, but with the eastern

3.



Section on the Ohio in vicinity of Newell's Run.

slope more steep than the western. Near the anticlinal lines at A, fig. 3, are oil and gas springs. A few miles south, on Cow Creek, Va., it is seen as

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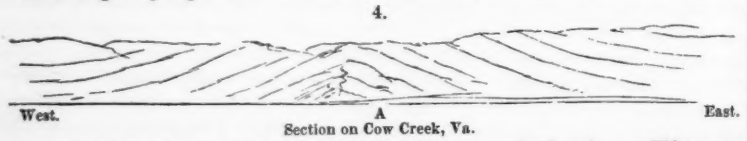


Section on Cow Creek, Va.

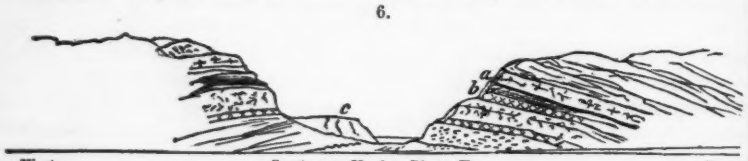
represented by fig. 4. At the anticlinal line are gas and oil springs. Fifteen or twenty miles farther south, near Petroleum, Ritchie Co., Va., the uplifting force has been greater and the strata have been broken apart and now stand on each side at an angle of about 50°. They are represented by the inclined strata B and

5.

Section near Petroleum Station, N. W. Va. RR.

C in fig. 5. At D, are seen strata from below, which have been forced up and wedged in between B and C. They have been bent by the great force to which they have been subjected. These strata contain seams of cannel and bituminous coal and are altogether new to me. At A, just within the steep rock, on the east, are gas and oil springs and some productive oil wells. At B, is seen the mouth of Oil Run, and at C, the mouth of Laurel Fork of Goose Creek, where the rocks of the western dip are finely exposed in a railroad cutting. A few miles further south and on the line of this geological disturbance we find, near where Hughes River crosses the uplift, many new and interesting strata, which have been lifted up from considerable depths. Some of these are shown in fig. 6. At *a* we find a seam of

6.



Section on Hughes River, Va.

light colored compact flint from eight to eleven feet in thickness. At *b* is a seam of shale, brown at the top and blackened with bitumen at the bottom, which is remarkably rich in fossils such as Productus, Chonetes, Bellerophon, &c. The exact equivalent of this deposit of fossils I have nowhere seen in the outcrop of our coal measures.

At *c*, is shown the alluvial bank of Hughes River, out of which large quantities of petroleum have in former years been taken. The oil came up through a fissure in the underlying rock and saturated a stratum of sand and gravel. This stratum was laid bare by removing the superincumbent earth and the oil worked out by hoes from the water and sand. This locality, next to the old Pennsylvania Oil Springs, has probably furnished more oil than any other locality in the country. A few wells have been bored in this region, but with what success I did not learn, nor had I time to investigate the question whether they were bored in that part of the geological disturbance, where the largest number of fissures would be found.

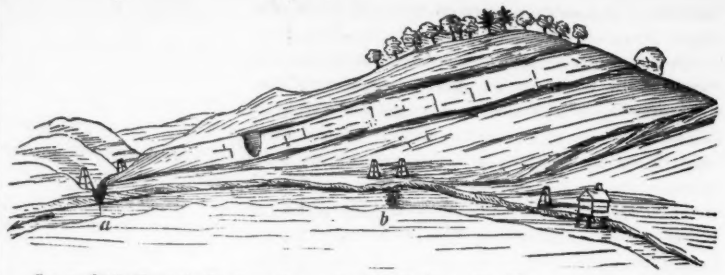
Between this point and the Little Kanawha River, the anticlinal line is easily traced, the rocks inclining to the east and to the west at angles varying from 28°

7.

Section on Little Kanawha in vicinity of Burning Spring Run.

to 8°. The rock are well exposed on the heads of Standing Stone Creek, and at other points. On the Little Kanawha, a section would be represonted by fig. 7.

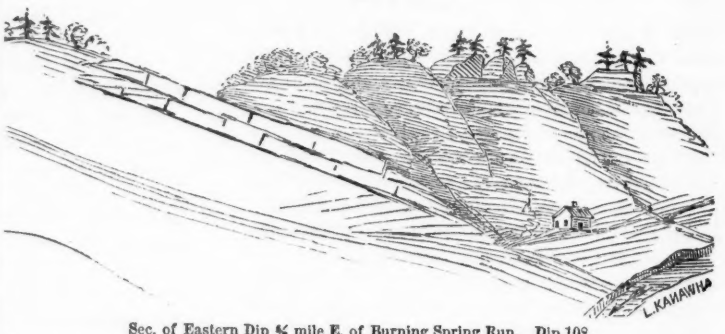
8.



Sec. on Little Kanawha R. above the mouth of Nettle Run. Dip West. *a* mouth of Nettle R., *b* ledge of rocks in the bed of river.

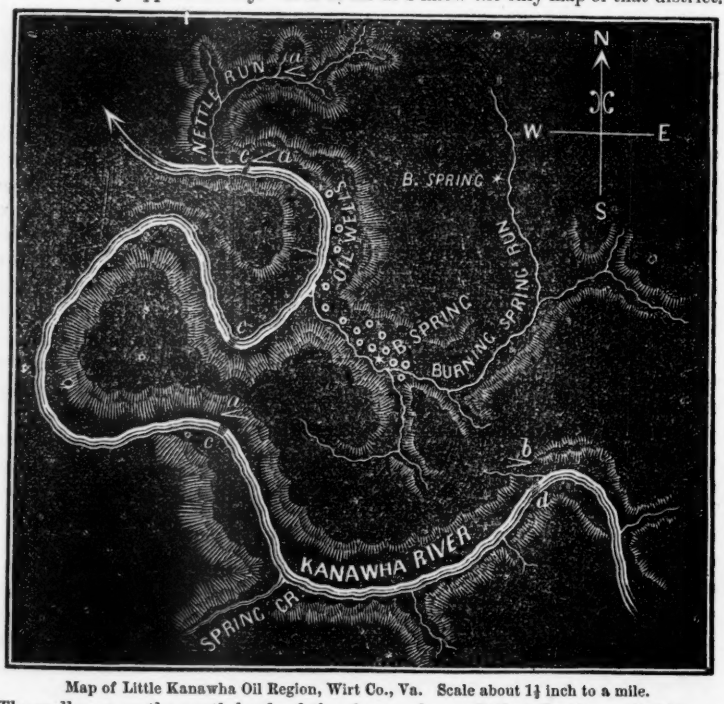
The anticlinal line, or centre of the uplift is seen at A. Near A and extending towards B are the great oil wells. They are exactly where the largest number of

9.



Sec. of Eastern Dip ¼ mile E. of Burning Spring Run. Dip 10°.

fissures would be made by the uplifting force. The accompanying figures 8 and 9 show the western and eastern slopes of the anticlinal. To the intelligent aid of E. H. Moore, Esq., of Athens, Ohio, I am indebted for the following map of the oil region of Little Kanawha. The directions and courses were taken accurately, the distances only approximately. It is so far as I know the only map of that district.



Map of Little Kanawha Oil Region, Wirt Co., Va. Scale about 1¾ inch to a mile.

The wells are on the north bank of the river and on a little tributary called Burning Spring Run. The hills in this region are very high. The valleys are all valleys of erosion. The three angles marked *a* indicate the position of the western slope of the rocks. On Nettle Run, the dip is 21°, at the other points somewhat less. At the points marked *c* are ledges of rock, seen in the bed of the river at low water, produced by the harder of the inclined strata.

At *b* the angle indicates the dip of the strata to the east. The rocks are there inclined at an angle of 11°. At *d* another ledge of rocks is seen in the bed of the river made by hard strata in their eastern dip. The central line or axis, between the two slopes, runs nearly north and south, and along this line the productive wells are found. Thus far, the oil is obtained only in a narrow range extending north and south, and little more than one hundred and twenty rods wide. On the west of this range many wells have been bored without success. The exact limit of the oil on the east is not yet known,—but wells, now being bored, will soon determine it. The oil fissures are struck at different depths, as has been already shown, consequently there is no such thing as an "oil rock" as many suppose. The oil is found in any kind of stratum. Each oil fissure doubtless extends vertically or nearly so, through many different strata.

These wells have been unparalleled for the quantity of oil produced. Many of them, when first bored, poured out the oil in torrents, the oil being forced up by the pressure of gas. Hundreds of barrels were obtained from a well in a few hours. The Camden, Lewellyn, Weare, and Harper wells, and doubtless others,

are fine illustrations of this. They yield a marvellous quantity of oil. In many wells the oil is entirely free from water and passes directly from the well into barrels for shipment. The oil varies in specific gravity from 32° to 42° (Beaumé).

The oil is evidently the accumulation of long ages. The valleys of erosion which cross this line of uplift in almost every direction, and which have been produced by the drainage of the rains falling upon the surface, show that the uplift and consequently the fissures underneath, have existed for a vast period of time. It is therefore probable that during this long period the work of accumulation has been going on. If this is true, it will follow that when a fissure is once exhausted of oil, it may well be abandoned, as it will take a geological period to refill it. The original indications of oil in this region were, as I learn, only the gas springs, of which there were two on Burning Spring Run. Both of them are now destroyed by wells that have taken away the gas. A salt well bored at the mouth of Burning Spring Run, many years ago, yielded a large quantity of oil, and it was this salt well which caused attention to be directed to this locality, now so famous.

I have thus shown some of the geological relations of the oil here in the upper part of the coal measures. The *horizontal* strata in Wood and Wirt counties, Va., are, I think, the highest in the series. Containing few fissures, the chances of finding oil in them is necessarily very small.

The *inclined* rocks with a dip of from fifteen to forty feet in a mile, contain more or less fissures, and consequently yield more or less oil. It is in these inclined rocks that the productive wells on Duck Creek, O., at McConnelsville, Pomeroy, &c., are obtained.

In the *broken* rocks, as found along the central line of a great uplift, we meet with the largest quantity of oil. It would appear to be a law, that the quantity of oil is in a direct ratio to the amount of fissures. By this law, the great wells on Little Kanawha are easily explained. With so much room for expansion, the hydro-carbons of the coal and bituminous strata underneath have risen in the form of vapor and during long geological ages have been filling the fissures withoil.

Since writing the above, I have examined the Report of the Geol. Survey of Kentucky, vol. iii, and find that the oil region which lies in Cumberland county and in several adjoining counties, is probably situated upon a line of peculiar disturbance. Mr. Owen states that "the principal axis of disturbance, already mentioned, which passes in a southwest course through Lincoln, Casey, Russell, and Cumberland into Monroe county, probably crosses the Cumberland (river) at the Riffle, near the Turkey River Bend, where a dip of about 4° was observed at the head of the Riffle in a direction of 50° east, while a reversed dip, north, 50° west, at about the same angle, was noticed near the foot of the Riffle." A careful examination might show that the fissures containing oil in this region are to be found chiefly along the line of this disturbance.

Of a locality in Cumberland county, Mr. Owen thus writes: "On Crocus Creek, the blue limestone dips 2° to the northeast; a short distance up Puncheon Camp, the slate dips at an angle of about 1° in a course south, 20° west, while not far off, on the Creek, it dips with about the same angle in a course north, 10° to 20° east. Hence it is evident that the dip is very irregular." On Crocus Creek and on other streams in that region large quantities of oil were found many years ago in boring for salt water. From all I can learn, without visiting the region, the oil is found chiefly in the blue limestone and below the black shale. The oil is light in its specific gravity, while oil from similar locations in the geological series, in Ohio, is very thick and tar-like.

The oil from the coal measures varies in specific gravity from perhaps 20° to 52° (B). Oil from Pomeroy, O., standing at 51° B. burns freely, and with brilliant flame, without distillation.

The heavier oils, such as are not profitable for distillation, afford a very superior lubricating oil. Hence the demand for heavy as well as light oils will doubtless be very great.—*Silliman's Journal.*

Coal Trade of Belgium.—During the year 1860 Belgium exported 3,140,000 tons of coal,—an increase of nearly 100 per cent. in ten years.

THE CONDUCTION OF HEAT BY GASES.

By G. Magnus.*

The cooling of a body *in vacuo* depends simply on the exchange of heat by radiation between the cooling mass and the encircling envelope. If the space contains gas, an ascending current is formed, which accelerates the cooling, added to which the property which the gas has of transmitting heat, or its diathermancy, concurs in producing cooling, provided the gases can conduct heat. Dulong and Petit, in enunciating their law of the loss of heat, have neglected the last two actions, manifestly because they are infinitely small compared with the influence of the ascending currents. Since then, it has been universally admitted that the differences in the cooling of the different gases depend on the different mobility of their particles. Cooling takes place much more rapidly in hydrogen than in other gases. With the same amount of heat, this gas expands not more, but less, than atmospheric air; the changes in density in the former gas are less than the latter. But it is the difference of specific gravity which produces currents. If, therefore, different gases by contact with a warmer body all become equally heated, the currents in those gases which have a greater co-efficient of expansion must be greater than in the rest; for example, in carbonic acid more than in hydrogen. As this is not the case, it must either be assumed that the friction of the gaseous particles against each other is so great that the influence of the greater expansion is neutralized by it, which will with difficulty be admitted, or it must be assumed that gases by contact with a hot body, become heated to a different extent. Such a difference in the degree of heat, would take place if the gases had different capacities for heat; but as the specific heats of hydrogen and atmospheric air are the same, there remains no other explanation for the more rapid cooling in hydrogen, than that this gas can transmit heat from particle to particle, in other words, can conduct it, and that it possesses this property in a higher degree than other gases. Its low density appeared to be in disaccordance with this idea, and it appeared necessary to decide by experiments how far it is founded.

The impulse to these experiments was given by a repetition of Mr. Grove's interesting observation, according to whch a platinum wire is less strongly heated when surrounded by hydrogen than by atmospheric air, or another gas. In this repetition, it was found that hydrogen exerted its preventive action even when a layer only 0.5 mil. thick surround the wire, and it was the same whether the tube containing it was in a horizontal or vertical position. In such a narrow tube, especially when it is horizontal, currents can scarcely occur; and when there are none, there remains no other explanation than that hydrogen conducts heat better than other bodies.

The simplest mode of ascertaining whether a gas conducts heat, consists in warming it from above, and observing the action on a thermometer placed within. It might be objected to this method that, even with heating from above, currents in the gas might be formed, and that thereby the temperature indicated by the thermometer in various gases might be different without any difference in conductibility.

There is one method of testing this objection. For if, in fact, a gas can conduct heat, the temperature assumed by a thermometer in a space heated from above must be lower when the conducting substance is wanting than when it is present; that is, it must be lower *in vacuo* than in a space filled with air.

In order to ascertain whether this was the case, a glass apparatus was used, in which a thermometer, observable from without, was firmly fixed. It could be filled with different gases, and these could be variously dilated. The upper part of this apparatus was maintained at the same temperature, namely, that of boiling water, and the temperature was observed which a thermometer introduced into the interior ultimately assumed. Of course the experiments with this apparatus were not made without numerous precautions; it was more particularly necessary that the whole apparatus should be always under the same conditions, so as to give off the heat imparted to it always in the same manner. For this it was necess-
rounding it should always be at
In these experiments, the temp
ing space was 15°.

In this way, the following resu
1. The temperature which a ther
assumes, in a space heated from abo
this space is filled with different gases.
gen, the temperature is higher than in a
3. In this gas, the temperature is higher th
and the denser the gas is, the higher is the
ture. 4. Hence, hydrogen conducts heat like
5. In all other gases, the temperature is lower t
vacuo; and the denser they are, the lower is the te
perature. 6. It cannot hence be concluded that gases do not conduct heat, but only that they do this in so small a degree that the action of conduction is cancelled by their diathermancy. 7. This remarkable property of hydrogen is evinced not only when it moves freely, but also when it is contained between eider down, or any loose substance which hinders its motion. 8. The great conductibility of this gas is a further confirmation of its analogy with metals. 9. Hydrogen conducts not only heat, but also electricity, better than other gases.

* Translated from the *Bericht der Berliner Akademie*, 1860, p. 485.

—KEROSOLENE.

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following
to the

Marlboro', Mass.—The Marlboro' Gas Company now manufacture, and burn daily, in the stores in the centre, gas of a very superior quality, composed of 70 per cent. decomposed water. Water-gas, as made by this concern, is no humbug. It is a decided and marked success. The light is soft and mellow, strong and vigorous, without that tiresome feeling that so annoys the eye, when gazing upon coal-gas. We consider it a decided improvement over the gas manufactured in the old way, and much cheaper. Capitalists have striven to put down this enterprise, but in vain; water-gas can be made of a superior quality to coal-gas, and it will prove a fortunate investment to all who are lucky enough to get stock in this new company. We want no better light than that afforded by it, and if we did, we could not find it, though we searched the world over. We rejoice that this special attempt has been made under the auspices of men of capital, who were able to bring this invention forth, regardless of opposition, and that it has been crowned with complete success.

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rocks of Western Virginia and Southeastern Ohio may be divided into three classes, *those which are almost entirely horizontal, those which have a dip of from fifteen to forty feet in the mile, and those which are broken and dislocated by an uplift.* The strata from the Ohio River at Parkersburg up the Little Kanawha to within a few miles of the great oil wells are very nearly horizontal and probably contain few fissures except such as may have been produced by the drying and shrinking of the rocks. There is not to my knowledge a single productive oil well in that region, although a large number of wells have been bored. The compact and unbroken clay shales and other strata rest upon the deep bituminous strata and furnish no spaces through which the oil vapor could rise. Probably no such vapor is formed.

On the Great Kanawha River, at Pomeroy, and vicinity on the Ohio River, in Athens, Morgan, Noble, Washington, and other counties in Ohio, located on the coal measures, the rocks have more or less dip, and contain, as a probable result of the uplifting force, many fissures. These counties all furnish oil—Noble and Washington in considerable quantities. The salt wells on Great Kanawha, at Pomeroy on the Ohio, on the Hocking and Muskingum Rivers, and on Duck Creek, revealed more or less oil.

But it is in regions where the strata have been the most disturbed and where the fissures are the most numerous, that the most oil is found.

I have recently traced a most interesting line of uplift and dislocation from the eastern part of Washington county, Ohio, to beyond the great oil wells on the Little Kanawha River. The direction of it is nearly north and south. It makes an angle of about 40° with the general course of the Alleghany Mountains. As seen in Ohio it presents a well marked anticlinal axis, but with the eastern

3.

Section on the Ohio in vicinity of Newell's Run.

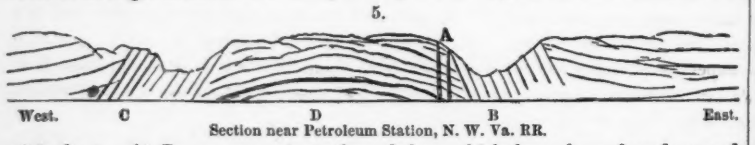
slope more steep than the western. Near the anticlinal lines at A, fig. 3, are oil and gas springs. A few miles south, on Cow Creek, Va., it is seen as

4.

Section on Cow Creek, Va.

represented by fig. 4. At the anticlinal line are gas and oil springs. Fifteen or twenty miles farther south, near Petroleum, Ritchie Co., Va., the uplifting force has been greater and the strata have been broken apart and now stand on each side at an angle of about 50°. They are represented by the inclined strata B and

5.



Section near Petroleum Station, N. W. Va. RR.

C in fig. 5. At D, are seen strata from below, which have been forced up and wedged in between B and C. They have been bent by the great force to which they have been subjected. These strata contain seams of cannel and bituminous coal and are altogether new to me. At A, just within the steep rock, on the east, are gas and oil springs and some productive oil wells. At B, is seen the mouth of Oil Run, and at C, the mouth of Laurel Fork of Goose Creek, where the rocks of the western dip are finely exposed in a railroad cutting. A few miles further south and on the line of this geological disturbance we find, near where Hughes River crosses the uplift, many new and interesting strata, which have been lifted up from considerable depths. Some of these are shown in fig. 6. At *a* we find a seam of

6.

Section on Hughes River, Va.

light colored compact flint from eight to eleven feet in thickness. At *b* is a seam of shale, brown at the top and blackened with bitumen at the bottom, which is remarkably rich in fossils such as Productus, Chonetes, Bellerophon, &c. The exact equivalent of this deposit of fossils I have nowhere seen in the outcrop of our coal measures.

At *c*, is shown the alluvial bank of Hughes River, out of which large quantities of petroleum have in former years been taken. The oil came up through a fissure in the underlying rock and saturated a stratum of sand and gravel. This stratum was laid bare by removing the superincumbent earth and the oil worked out by hoes from the water and sand. This locality, next to the old Pennsylvania Oil Springs, has probably furnished more oil than any other locality in the country. A few wells have been bored in this region, but with what success I did not learn, nor had I time to investigate the question whether they were bored in that part of the geological disturbance, where the largest number of fissures would be found.

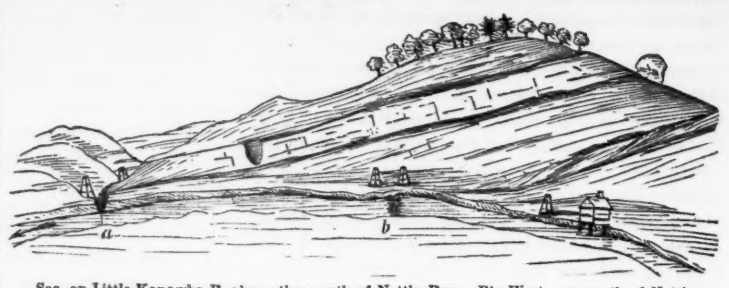
Between this point and the Little Kanawha River, the anticlinal line is easily traced, the rocks inclining to the east and to the west at angles varying from 28°

7.

Section on Little Kanawha in vicinity of Burning Spring Run.

to 8°. The rock are well exposed on the heads of Standing Stone Creek, and at other points. On the Little Kanawha, a section would be represented by fig. 7.

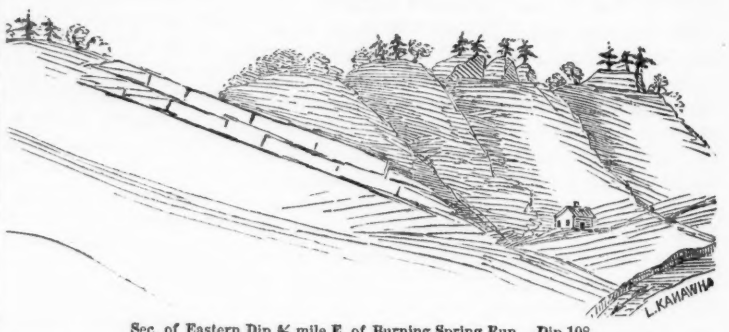
8.



Sec. on Little Kanawha R. above the mouth of Nettle Run. Dip West. *a* mouth of Nettle R., *b* ledge of rocks in the bed of river.

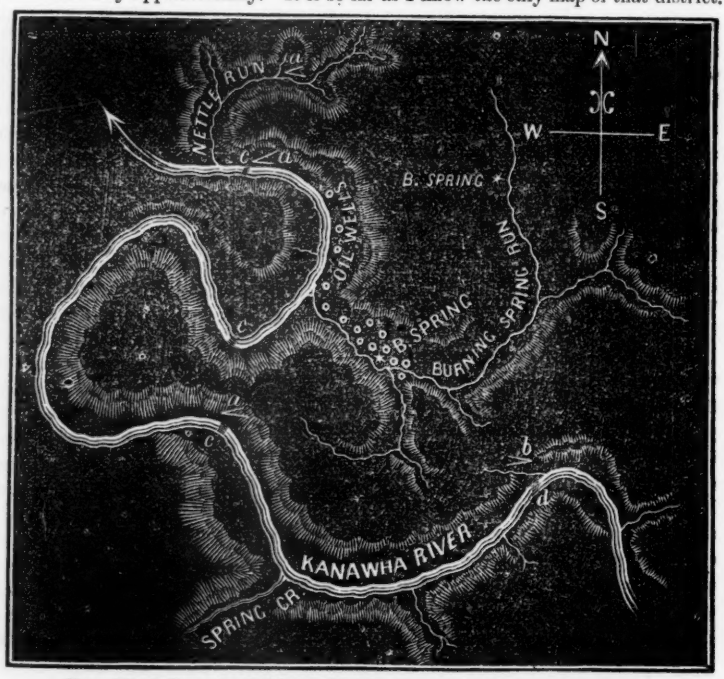
The anticlinal line, or centre of the uplift is seen at A. Near A and extending towards B are the great oil wells. They are exactly where the largest number of

9.



Sec. of Eastern Dip ⅝ mile E. of Burning Spring Run. Dip 10°.

fissures would be made by the uplifting force. The accompanying figures 8 and 9 show the western and eastern slopes of the anticlinal. To the intelligent aid of E. H. Moore, Esq., of Athens, Ohio, I am indebted for the following map of the oil region of Little Kanawha. The directions and courses were taken accurately, the distances only approximately. It is so far as I know the only map of that district.



Map of Little Kanawha Oil Region, Wirt Co., Va. Scale about 1¾ inch to a mile.

The wells are on the north bank of the river and on a little tributary called Burning Spring Run. The hills in this region are very high. The valleys are all valleys of erosion. The three angles marked *a* indicate the position of the western slope of the rocks. On Nettle Run, the dip is 21°, at the other points somewhat less. At the points marked *c* are ledges of rock, seen in the bed of the river at low water, produced by the harder of the inclined strata.

At *b* the angle indicates the dip of the strata to the east. The rocks are there inclined at an angle of 11°. At *d* another ledge of rocks is seen in the bed of the river made by hard strata in their eastern dip. The central line or axis, between the two slopes, runs nearly north and south, and along this line the productive wells are found. Thus far, the oil is obtained only in a narrow range extending north and south, and little more than one hundred and twenty rods wide. On the west of this range many wells have been bored without success. The exact limit of the oil on the east is not yet known,—but wells, now being bored, will soon determine it. The oil fissures are struck at different depths, as has been already shown, consequently there is no such thing as an "oil rock" as many suppose. The oil is found in any kind of stratum. Each oil fissure doubtless extends vertically or nearly so, through many different strata.

These wells have been unparalleled for the quantity of oil produced. Many of them, when first bored, poured out the oil in torrents, the oil being forced up by the pressure of gas. Hundreds of barrels were obtained from a well in a few hours. The Camden, Lowellyn, Weare, and Harper wells, and doubtless others,

are fine illustrations of this. They yield a marvellous quantity of oil. In many wells the oil is entirely free from water and passes directly from the well into barrels for shipment. The oil varies in specific gravity from 32° to 42° (Beaumé).

The oil is evidently the accumulation of long ages. The valleys of erosion which cross this line of uplift in almost every direction, and which have been produced by the drainage of the rains falling upon the surface, show that the uplift and consequently the fissures underneath, have existed for a vast period of time. It is therefore probable that during this long period the work of accumulation has been going on. If this is true, it will follow that when a fissure is once exhausted of oil, it may well be abandoned, as it will take a geological period to refill it. The original indications of oil in this region were, as I learn, only the gas springs, of which there were two on Burning Spring Run. Both of them are now destroyed by wells that have taken away the gas. A salt well bored at the mouth of Burning Spring Run, many years ago, yielded a large quantity of oil, and it was this salt well which caused attention to be directed to this locality, now so famous.

I have thus shown some of the geological relations of the oil here in the upper part of the coal measures. The *horizontal* strata in Wood and Wirt counties, Va., are, I think, the highest in the series. Containing few fissures, the chances of finding oil in them is necessarily very small.

The *inclined* rocks with a dip of from fifteen to forty feet in a mile, contain more or less fissures, and consequently yield more or less oil. It is in these inclined rocks that the productive wells on Duck Creek, O., at McConnelsville, Pomeroy, &c., are obtained.

In the *broken* rocks, as found along the central line of a great uplift, we meet with the largest quantity of oil. It would appear to be a law, that the quantity of oil is in a direct ratio to the amount of fissures. By this law, the great wells on Little Kanawha are easily explained. With so much room for expansion, the hydro-carbons of the coal and bituminous strata underneath have risen in the form of vapor and during long geological ages have been filling the fissures withoil.

Since writing the above, I have examined the Report of the Geol. Survey of Kentucky, vol. iii, and find that the oil region which lies in Cumberland county and in several adjoining counties, is probably situated upon a line of peculiar disturbance. Mr. Owen states that "the principal axis of disturbance, already mentioned, which passes in a southwest course through Lincoln, Casey, Russell, and Cumberland into Monroe county, probably crosses the Cumberland (river) at the Riffle, near the Turkey River Bend, where a dip of about 4° was observed at the head of the Riffle in a direction of 50° east, while a reversed dip, north, 50° west, at about the same angle, was noticed near the foot of the Riffle." A careful examination might show that the fissures containing oil in this region are to be found chiefly along the line of this disturbance.

Of a locality in Cumberland county, Mr. Owen thus writes: "On Crocus Creek, the blue limestone dips 2° to the northeast; a short distance up Puncheon Camp, the slate dips at an angle of about 1° in a course south, 20° west, while not far off, on the Creek, it dips with about the same angle in a course north, 10° to 20° east. Hence it is evident that the dip is very irregular." On Crocus Creek and on other streams in that region large quantities of oil were found many years ago in boring for salt water. From all I can learn, without visiting the region, the oil is found chiefly in the blue limestone and below the black shale. The oil is light in its specific gravity, while oil from similar locations in the geological series, in Ohio, is very thick and tar-like.

The oil from the coal measures varies in specific gravity from perhaps 20° to 52° (B). Oil from Pomeroy, O., standing at 51° B. burns freely, and with brilliant flame, without distillation.

The heavier oils, such as are not profitable for distillation, afford a very superior lubricating oil. Hence the demand for heavy as well as light oils will doubtless be very great.—*Silliman's Journal.*

Coal Trade of Belgium.—During the year 1860 Belgium exported 3,140,000 tons of coal,—an increase of nearly 100 per cent. in ten years.

THE CONDUCTION OF HEAT BY GASES.

By G. Magnus.*

The cooling of a body *in vacuo* depends simply on the exchange of heat by radiation between the cooling mass and the encircling envelope. If the space contains gas, an ascending current is formed, which accelerates the cooling, added to which the property which the gas has of transmitting heat, or its diathermancy, concurs in producing cooling, provided the gases can conduct heat. Dulong and Petit, in enunciating their law of the loss of heat, have neglected the last two actions, manifestly because they are infinitely small compared with the influence of the ascending currents. Since then, it has been universally admitted that the differences in the cooling of the different gases depend on the different mobility of their particles. Cooling takes place much more rapidly in hydrogen than in other gases. With the same amount of heat, this gas expands not more, but less, than atmospheric air; the changes in density in the former gas are less than the latter. But it is the difference of specific gravity which produces currents. If, therefore, different gases by contact with a warmer body all become equally heated, the currents in those gases which have a greater co-efficient of expansion must be greater than in the rest; for example, in carbonic acid more than in hydrogen. As this is not the case, it must either be assumed that the friction of the gaseous particles against each other is so great that the influence of the greater expansion is neutralized by it, which will with difficulty be admitted, or it must be assumed that gases by contact with a hot body, become heated to a different extent. Such a difference in the degree of heat, would take place if the gases had different capacities for heat; but as the specific heats of hydrogen and atmospheric air are the same, there remains no other explanation for the more rapid cooling in hydrogen, than that this gas can transmit heat from particle to particle, in other words, can conduct it, and that it possesses this property in a higher degree than other gases. Its low density appeared to be in disaccordance with this idea, and it appeared necessary to decide by experiments how far it is founded.

The impulse to these experiments was given by a repetition of Mr. Grove's interesting observation, according to whch a platinum wire is less strongly heated when surrounded by hydrogen than by atmospheric air, or another gas. In this repetition, it was found that hydrogen exerted its preventive action even when a layer only 0.5 mil. thick surround the wire, and it was the same whether the tube containing it was in a horizontal or vertical position. In such a narrow tube, especially when it is horizontal, currents can scarcely occur; and when there are none, there remains no other explanation than that hydrogen conducts heat better than other bodies.

The simplest mode of ascertaining whether a gas conducts heat, consists in warming it from above, and observing the action on a thermometer placed within. It might be objected to this method that, even with heating from above, currents in the gas might be formed, and that thereby the temperature indicated by the thermometer in various gases might be different without any difference in conductibility.

There is one method of testing this objection. For if, in fact, a gas can conduct heat, the temperature assumed by a thermometer in a space heated from above must be lower when the conducting substance is wanting than when it is present; that is, it must be lower *in vacuo* than in a space filled with air.

In order to ascertain whether this was the case, a glass apparatus was used, in which a thermometer, observable from without, was firmly fixed. It could be filled with different gases, and these could be variously dilated. The upper part of this apparatus was maintained at the same temperature, namely, that of boiling water, and the temperature was observed which a thermometer introduced into the interior ultimately assumed. Of course the experiments with this apparatus were not made without numerous precautions; it was more particularly necessary that the whole apparatus should be always under the same conditions, so as to give off the heat imparted to it always in the same manner. For this it was neces
rounding it should always be at
In these experiments, the temp
ing space was 15°.

In this way, the following resu
1. The temperature which a ther
assumes, in a space heated from ab
this space is filled with different gases.
gen, the temperature is higher than in
3. In this gas, the temperature is higher th
and the denser the gas is, the higher is th
ture. 4. Hence, hydrogen conducts heat like
5. In all other gases, the temperature is lower t
vacuo; and the denser they are, the lower is the t
perature. 6. It cannot hence be concluded that gases do not conduct heat, but only that they do this in so small a degree that the action of conduction is cancelled by their diathermancy. 7. This remarkable property of hydrogen is evinced not only when it moves freely, but also when it is contained between eider down, or any loose substance which hinders its motion. 8. The great conductibility of this gas is a further confirmation of its analogy with metals. 9. Hydrogen conducts not only heat, but also electricity, better than other gases.

* Translated from the *Bericht der Berliner Akademie*, 1860, p. 485.

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THE
AMERICAN GAS-LIGHT JOURNAL,

PUBLISHED ON 1ST AND 15TH OF EVERY MONTH.

PROPRIETOR, JOHN B. MURRAY. | EDITOR, C. ELTON BUCK.

MONDAY, SEPTEMBER 2, 1861.

For some time past the proper disposition of lights on the stage and other parts of theatres, has attracted the attention of architects and others connected with the construction and management of places of amusement. In Europe, and especially in France, this subject has been deemed one of great importance, and has attracted the notice of eminent scientific, as well as professional observers, and a general denunciation of the present mode of placing the lights—particularly the foot-lights—has been uttered, and the probability is that other and more rational means will be eventually adopted.

This subject was considered of sufficient importance to engage the attention of the French Academy of Sciences, and as we mentioned on page 383 of vol. 2, the President made the foot-lights of theatres the theme of a communication, in which it was stated that, as usually placed, they are extremely hurtful to the eyes and voices of the actors, especially to the singers, and it was recommended that the foot-lights be replaced by a system of illumination from above, invisible to the public, and exercising no noxious influence over the performance.

In view of the many dangers and disadvantages attending the present mode of lighting theatres, it is strange that suggestions on this subject should not have been thrown out before now, by those most interested. The danger alone of foot-lights to the thin gauzy dresses which are so much used on the stage, apart from other considerations, is a powerful incentive to the adoption of a more judicious system. The number of lives which have been lost by fire from this source, is a strong appeal to the sensibilities of those who control the workings of the mimic scene, and who can but be conscious of the perils to which actresses in particular are exposed. The injury done to the eye by the unbroken glare of the foot-lights—placed in so unnatural a position—is doubtless very marked; while the heat emitted, and the products of combustion which are generated—not being conducted away as they should be—mingle with the surrounding air, thus creating an unwholesome atmosphere which would be deleterious to any, but particularly to those who, like actors, are compelled to use vocal and physical exertions, while most exposed to the influence of these noxious emanations.

The strange appearance which foot-lights cast upon the persons of actors is an effect which appeals directly to the audience, and which cannot fail to be remarked. The shadows cast by the more prominent features upon the remainder of the face are unnatural in the highest degree, and so singular is the effect with some expressions, that recognition under other circumstances would be almost an impossibility.

The manager of the Paris Opera House has judiciously inaugurated a new system of lighting, in which the usual foot-lights are dispensed with, and in their place, the row of gas-burners is placed 80 centimètres (about 31.5 inches) below the stage, and entirely enclosed. A number of curved reflectors, placed at the proper angle, throw the rays of light to the scene through an inclined opening which is of necessity above the stage, extending the length of the "ramp" as the row of lights below. This opening is glazed with ground glass, thus preventing the naked glare which would otherwise dazzle the eyes of the actors. The lights being thus enclosed, the products of combustion are precluded from mingling with the air, but are carried off by suitable ducts at either end of the stage, where they pass into perpendicular pipes which lead them above the roof of the house. This mode of lighting is said to be more costly than the old method. Its chief value is in its freedom from danger and from all deleterious influences to the actors. This arrangement, however, although enclosing the lights and doing away with their noxious qualities, does not remove them to a more suitable position. In order to have a proper effect, they should be arranged above the stage, so as to shed a natural light and to cast the shadows of objects on the stage in a similar manner to that of the sun, which the artificial light is intended to represent.

The subject of lighting and ventilating theatres occupies much attention in Paris. The papers and scientific periodicals abound in articles written to effect a reform in this respect. M. Dumas, the celebrated chemist, presides over a commission which has been making the subject a study for some time, and from the earnestness with which every fact bearing upon this important matter is investigated, it is evident that the evils of the old system have become so obnoxious as to call loudly for a remedy.

The erection of a new Opera House, and several theatres, in Paris, has doubtless stimulated attention to this subject, and concentrated upon it an unwonted share of study. That much room for improvement existed, none who have noticed the nuisances of the plan of foot-lights usually adopted in this country, can doubt. A beginning has been made towards ameliorating the evil, and it remains to be seen whether the enterprise of architects, managers, &c., will introduce the improvement on this side of the Atlantic.

KEROSOLENE.

The past few years have witnessed a remarkable number of discoveries in the province of organic chemistry, and a multitude of processes have been invented for the utilization of by-products, which were formerly esteemed of little or no value. Among the investigations which have resulted in the successful development of new branches of technical skill, have been those which were more especially directed to the products of the destructive distillation of coal. In this particular field of study the new facts brought to light are wonderful, and the number of substances hitherto unknown, which have been isolated and examined, is almost incredible. In the list of these products—a long catalogue of substances, some of which are destined to play an important part in the arts—we have a striking commentary of the value of chemical research, and of the close connection existing between scientific investigation and the consequent stimulus which is imparted to manufacturing enterprise. Among the products now extracted from coal by distillation, it will be unnecessary to allude to illuminating gas, oils for lighting and lubricating purposes, paraffine, naphthaline, benzine, or the numerous other well-known substances which are familiar articles of trade. In addition to these, late discoveries have made known the existence of colors which rival the most gorgeous tints obtained from other sources; and as many different shades have been prepared from these, it is not presuming too much to predict the discovery of still other hues from the same material. Nor is this all—the perfumer is furnished by the chemist with odors so nearly resembling the essential oils of valued plants, as to make it difficult to distinguish between the two, the perfume derived from coal being prepared at much less cost than that from the natural source, it is more rapidly disposed of, and meets with a large demand.

But passing by the numerous other products of the distillation of coal, we wish to call attention to the remarkable anæsthetic properties of kerosolene as discovered by Joshua Merrill, Esq., the superintendent of the Downer Kerosene Oil Company, of Boston, Mass. In another column will be found the report of Dr. H. J. Bigelow, taken from the Boston *Medical and Surgical Journal*, as to the efficacy of this substance as an anæsthetic agent. It will be seen that kerosolene, unlike ether or chloroform, on evaporation leaves no odor whatever, thus leaving no trace of its presence in the room where it has been used, or about the person of the patient under its influence. It is described as being far pleasanter to the taste and smell than any other anæsthetic; and, unlike chloroform or ether, it leaves no flat, stale taste with the patient, which those substances do, sometimes continuing for a day or more after the discontinuance of the inhalation. Additional experiments are being made with kerosolene, under the auspices of the Boston Society for Medical Improvement.

The kerosolene used by Dr. Bigelow in the experiments referred to, is not the article generally known by that name, but it is submitted to a careful purification by the use of acids and alkalis, which removes all traces of color, and leaves but a faint, delicate odor somewhat resembling that of chloroform. It is very volatile, and as ordinarily made, its boiling point varies from 50° to 120°, F.

Mr. Merrill's attention was first directed to the anæsthetic properties of kerosolene by observing its effects upon a workman who had been sent in to clean a cistern at the oil works. Afterwards, experiments on small animals, such as flies, mice, kittens, &c., exhibited its quality of inducing insensibility to pain in a more marked degree. Whether the use of this substance will evince a general tendency to asphyxia, as already noticed in some cases, future trials will demonstrate.

The report of Dr. Bigelow will be looked for with some interest by the medical profession, and it may open a new field for the employment of this substance on an extended scale.

THE WATER GAS.

On another page we publish an extract from a Marlboro', Mass., paper, announcing the successful inaugaration of the water-gas works in that town. It is stated to be a brilliant success, and the operation of the works is fully equal to the most sanguine expectations entertained of them. On page 25 of this volume we published a letter from Mr. Severin, proprietor of the water-gas works at Aurora, Ind., in which he spoke very highly of the process, and after an experience of eight months in the practical management of his works, he not only manufactures the gas as cheaply as he had expected to, but had actually reduced the cost, by discovering a carbonizing agent which replaced rosin altogether, at about half the price.

We regard the experience of Mr. Severin as very valuable to the friends of the water-gas, for his testimony in its favor has all the air of sincerity and truth. Being struck with the apparent simplicity of the process, Mr. Severin purchased the patent right for the town of Aurora, and on his own

account erected the works, and embarked in the business of making gas, as a means of livelihood. Entirely unacquainted with the business before, he had not the advantage of experience to guide him, but relying solely on his energy and common sense, he pushed forward his enterprise, and has made improvements which the patentee himself did not dream of. His works may now be regarded as a permanent institution, and whatever may be the fate of the water-gas elsewhere, according to Mr. Severin's testimony it furnishes the town with light, and amply remunerates him for making it, which is about all that could be desired.

NOTICE TO SUBSCRIBERS IN GREAT BRITAIN.

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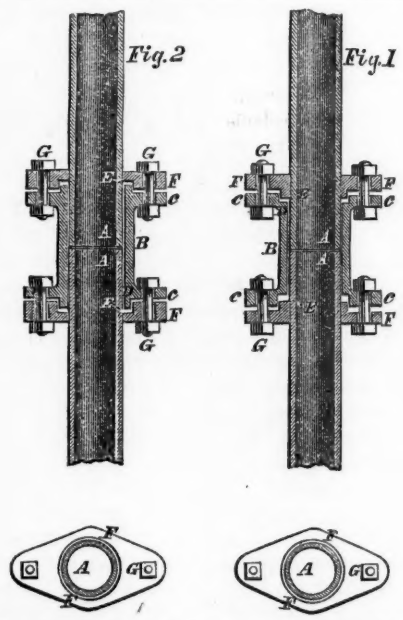
TO PHILADELPHIA ADVERTISERS.

Mr. V. HAROLD MYERS, No. 152 South Fourth Street, is our sole agent for Philadelphia, and is authorized to receive subscriptions and advertisements at our regular rates, *payable in advance* in all cases.

TO GAS ENGINEERS.—Your attention is directed to an advertisement in to-day's JOURNAL of an Engineer and Superintendent who desires a change of location. He is one of the ablest gas engineers in the country.

NEW METHOD OF CONNECTING GAS-PIPES.

The annexed wood-cut will explain the mode of connecting gas-pipes, which was patented in England, Jan. 11, 1861, by Alphonse Rene le Mire Normandy.



The pipes, lettered in the cut A A, are made plain from end to end, and on placing them together, a short cylinder B is slipped over the ends. This cylinder has sockets or recesses at its two ends, of larger diameter than other parts of the cylinder, and also the flanges C C. Rings of vulcanized india-rubber D D, or other suitable packing material, are introduced into the sockets or recesses. Screw bolts G G, are introduced into the danges, which, on being drawn together, form an air-tight joint.

DETROIT, MICH.—Water-works built in 1840, enlarged in 1860. Cost $83,000. Capacity of reservoir 10,000,000 gallons. Average daily delivery 2,142,744 gallons, distributed through 38 miles iron pipe and 22 miles wooden logs. Use Worthington's meters.

RAIN-FALL OF THE TROPICS.—The rain-fall in the tropics is one hundred and fifty inches per annum, and in particular places it reaches two hundred and fifty, and even three hundred inches, all of which takes place within a period of a few months.

ANSWERS TO CORRESPONDENTS.

O. P. A., of N. Y.—*Your first letter was not received We will advise you as to the results of the trial. The apparatus is very pretty, and seems well adapted to meet all the requirements expected of it. A short time will suffice to prove its worth.*

E. W. S., of Conn.—*Take equal parts of white lead, oxide of manganese and pipe-clay; grind thoroughly with linseed oil varnish. This is said to be an excellent cement for steam pipes.*

J. A. L., of Mass.—*The experiment was a success in every respect, and surpassed the most sanguine expectations of all who witnessed it. There must be a great deal in the manner in which the details are managed, for the same essay in another place utterly failed, although apparently the circumstances under which it was performed were precisely similar to those in which success was achieved.*

E. D., of Pa.—*A mixture of mutton and beef tallow will make a candle stock much superior to either of the two used separately. For warm climates, the tallow should be pressed.*

U. P. J., of N. J.—*Gas mains are made in some parts of Great Britain, with turned joints, one end slightly larger than the other, and fitting over the smaller end The joint thus made is said to be much tighter than that made by the molten lead and hemp, and the amount of lea age has been very materially lessened. We believe some of the street mains of Liverpool, England, are made thus.*

F. P. G., of Ohio.—*The form of still you describe has no novel feature. It has been used in several large oil works for more than a year.*

Fides, of Md.—*Clegg was the inventor of the first self-acting apparatus for the measurement of gas. The principle of the Archimedian screw, was first applied to gas meters by Mr. John Malam.*

A. P. S., of Ind.—*Coal oil, when manufactured by experienced parties, and properly refined, is a very safe illuminating agent. Some cases of explosions are on record, but they have been occasioned by an improper admixture of light and heavy oils, which should have been separated by the manufacturer.*

L. D., of Ky.—*From the description you give of your town, we should think it capable of supporting gas-works. In England, towns of much smaller size and fewer inhabitants, have had paying gas works for years back.*

E. J. F., of Mich.—*The specific gravity of hydrogen gas is* 0.0692. *That of carbonic acid is* 1.5290: *of oxygen,* 1.1056.

D. P. A., of Vt.—*In* 1852 *there were in London,* 18 *gas works, employing a capital of* $14,000,000, *and producing a yearly revenue of* $2,250,000. *Since that time there has been a large increase, but we have not now the data at hand to state the actual expansion of the gas business in London.*

C. S. W., of Pa.—*The original experiments of Chevreul respecting the composition of fats, were made public in* 1823. *In* 1825, *Chevreul & Gay-Lussac, took out a patent for the manufacture of fatty acids. De Milly first successfully substituted lime for alkalies in the process of saponification.*

R. N. H., of N. Y.—*We will examine the facts of the case and notify you of our opinion.*

DAMAGE TO SEWERS IN BROOKLYN, N. Y.—The recent heavy rains have caused more damage than at first supposed, especially to the sewers now in course of construction in the Ninth, Eleventh, and other wards. The excavations in Fulton and Atlantic avenues and intersecting streets have been filled up in some places, and in others the pavements have caved in on both sides, leaving deep chasms. It will take days and perhaps weeks before all the damage can be repaired. The foundation of a new three-story brick house, brown stone front, in Degraw street, gave way, and the walls being out of plumb, there is danger that the whole will come down. The building was not quite finished.

DR. J. NORTHCOTE VINEN'S FORTNIGHTLY REPORT ON THE GAS SUPPLIED BY THE SURREY CONSUMERS' COMPANY OF LONDON.—

Week end. 1861.	No. of Observations.	Max'm Light. Candles.	Min'm Light. Candles.	Ave. Light. Candles.
July 6,	4	14.74	12.24	13.39
" 13,	4	14.56	11.39	13.15

Volume of hydrocarbons averaged 5 per cent. Carbonic acid 0.50 per cent. Sulphuretted hydrogen, none. Ammonia was present July 3, 5, 8, and 13. Maximum pressure, 2.30 inches. Minimum pressure, 0.2. The ordinary working pressure averaged 0.50 of an inch.

A NEW ANÆSTHETIC—KEROSOLENE.

At the meeting of the Boston Society for Medical Improvement, held on Monday evening July 9th, a liquid bearing the above name, and suspected of possessing anæsthetic properties, was presented by Dr. Bowditch, from Mr. Merrill, and by a vote the Hospital Surgeons, with Dr. Bacon, were requested to test its powers, and Dr. H. J. Bigelow was requested to make a subsequent report upon the subject to the Society. As some time must elapse before such a report can be made, Dr. Bigelow has, at our request, furnished us the following statement of his experience of its powers up to the present time.

MESSRS. EDITORS,—In reply to your request for information concerning the "kerosolene," and although the evidence is incomplete, I see no impropriety in my furnishing you with such observations as I have been able to make since its introduction to the Medical Society last evening, by Mr. Merrill, Dr. Dickinson, and Dr. Bowditch, as an untried agent of suspected anæsthetic properties, which had accidentally affected a man sent in to clean a cistern at the kerosene works and which had been afterwards tried on flies and mice.

This fluid presents remarkable properties. It is tasteless as water, volatile and inflammable as ether, though burning with a dense white light; of a faint chloroform odor, which, as it evaporates, changes to that of coal tar, and then disappears absolutely and altogether; so that a handkerchief saturated with the fluid has, at the end of a few minutes, when dry, no odor at all, nor has the room or atmosphere where it has been used, any trace of its presence. Both ether and chloroform leave, in different degrees, a persistent, *fade* and stale aroma after evaporation, as is well known. They are also far less agreeable to inhale than this new agent, which has thus an obvious advantage over either of them.

A few whiffs were sufficient assurance of its efficacy as an anæsthetic, which, with its other qualities, as I ventured to remark, would place the kerosolene beyond any known anæsthetic, provided its use was not followed by headache, vertigo, or other unpleasant symptoms, and provided it should prove as free from danger as ether.

Subsequently, I inhaled the new vapor, which Dr. Hodges, at my request, administered. Complete insensibility supervened, lasting several minutes, with some diminution of the volume of the pulse. Its effect was wholly agreeable, leaving neither headache nor nausea, nor bad taste.

I have this morning administered it to three surgical patients. The first, a girl of 19, presenting some hysteric tendencies, having thrust some twenty needles in her leg, was wholly insensible during the extraction of four of those which remained. Yet there was more cough than I had expected from the wholly unirritating odor of the vapor, more muscular rigor than usual in favorable anæsthesia, and more intermittence of the pulse.

In a second patient, to whom it was given preparatory to an operation upon the face, insensibility was equally complete. But this women did not take it kindly, and its complete effect was attended by so feeble and intermittent a pulse as to lead me to desist until she had recovered. A second attempt reproduced, with anæsthesia, the feeble and intermittent pulse, and I again desisted. Upon her recovery, I gave her common ether vapor, which she afterwards said was less agreeable, but which was followed by complete insensibility, the pulse beating steadily and full, at 76. Though this patient perhaps succumbed more readily to a third anæsthesia, there seemed to be in the two first trials a certain degree of purple color and asphyxia, with its attendant spasm, which I have elsewhere described as an occasional and disagreeable symptom of attempted anæsthesia. To guard against this asphyxia, which might possibly have resulted from the folded towel, upon which I habitually administer ether, I tried in the next case an open sponge. The subject required a considerable incision for a mammary abscess, and was a patient of Dr. H. G. Clark, with whose assent I tried the kerosolene. In spite of the open sponge, the symptoms of asphyxia again appeared, suggesting to Dr. Clark before operating their resemblance to those resulting from charcoal gas. The color

was livid, and the rigidity marked. In each of these cases, the quantity used was from one to two ounces.

In conclusion, it may be remarked of these three cases, that they are insufficient for satisfactory demonstration, and that their common and unfavorable symptoms may well have been but a coincidence; yet they suggest some caution in the use of the kerosolene vapor. It is probably more potent than that of ether, requires a free admixture of air, and may produce upon the system some impression or influence, other than that of the mere intoxication attendant upon the use of ether. In awaiting further evidence, it may be considered established that kerosolene is an anæsthetic of undoubted efficiency, and that it possesses certain remarkable and attractive properties peculiar to itself.—*Boston Medical and Surgical Journal.*

THE TURBINE WATER WHEELS FOR FAIRMOUNT.

The term Turbine is applied now to all water wheels having their axes or shafts placed in a vertical position, excepting those rude wooden wheels, called flutter wheels, cheaply made and used in new countries for saw-mills, when saving the water, from its abundance, is no object, and which have their shafts either in a vertical or horizontal position.

The simplest kinds of Turbines have been used in civilized and semi-civilized countries from very early dates, especially in mountain districts, and in the mountainous regions of Germany, Switzerland, France, and Spain, and even those parts of northern Africa influenced by the civilization of the Moors, there might have been found specimens, which, although rudely constructed, from the want of the exact and powerful tools used at this day for constructing the machinery designed by the modern mechanic, yet the proper application of mechanical principles shown in their construction, would receive the admiration of the modern engineer, who, from not having paid particular attention to the subject, imagines the construction of Turbines to be entirely of modern times—even in our own State, especially those parts settled by Germans, varieties may be found, that show the localities in Europe from which the early settlers brought their knowledge of this system of hydraulic motor.

The Jonval Turbine, which is nearly ready for the works at Fairmount, takes the name from the fact of Jonval perfecting the proper curves for the guides and buckets, and also applying a principle not hitherto used, of suspending the moving wheel above the level of water in the tail race. This improvement, called in this country the principle of the draft-box, was also discovered about the same time, but I believe without the knowledge by either party, of its invention by the other, by Mr. Zebulon Parker, who applied the principle to his "Parker Wheel." The Jonval Turbine consists of a cast-iron cylinder placed at the bottom of a penstock, which penstock for most falls does not require to be more than six or seven feet deep—this cylinder, which is open at the top and bottom, extends from the bottom of the penstock to the lower level of water or the level of water in the tail race, having this lower end submerged three or four inches below the surface of the water—the cylinder is contracted to a little more than the diameter of the moving wheel, (only sufficiently large to allow the wheel to revolve without touching the cylinder.) Where the moving wheel is placed above this, the cylinder is made conical, having the largest diameter at the upper part of the cylinder, the portion of the cylinder just below the moving wheel is slightly increased in diameter, and is extended down at this increased diameter to the tail race. The guide wheel consists of a rim of cast-iron surrounding and cast fast to a disc of cast-iron, through the centre of which the upright shaft which conveys the motion of the moving wheel to the machinery to be driven projects—the hole in the disc for the shaft to pass through being rather larger in diameter than the shaft. Around the cast-iron rim the guides of plate wrought iron, are arranged in such a manner as to guide the water properly on the buckets of the moving wheel. This whole arrangement, disc, rim, and guides, which is called the stationary or guide wheel, sets, without being secured by bolts, in the conical part forming the upper portion of the cylinder. The water passes into the openings between the upper edges of the guides, and, passing downwards, is directed on the upper portion of the buckets of the moving wheel at the proper angle for producing the best effect.

The moving wheel is also composed of a cast-iron rim surrounding a disc; in the centre of the disc is a hub, through which the shaft passes, and to which shaft the disc is keyed or bolted fast. Around the rim are arranged wrought-iron plate buckets of the proper curve, and surrounding the outer extremities of these buckets a wrought-iron ring is shrunk, thus rendering it almost impossible to break out a bucket. The water being directed properly on these buckets by the guides above, give motion to the wheel, which carries the shaft to which it is keyed around at the proper velocity. The water, after passing through the openings of the buckets, passes into the cylinder below, and is discharged from the cylinder into the tail race, around the bottom edge of the cylinder, three or four inches below the surface of the water in the tail race.

There is a variety of gates used for stopping the flow of the water through the moving wheel in this system of Turbines. The most simple kind, and that used for wheels of small diameter, being a throttle valve, placed in the cylinder, below the moving wheel; that used for larger wheels, and also a better kind of gate, is a circular cast-iron piece, which slides up and down around the bottom of the cylinder, and when completely closed, rests on a plate or ring, fastened to the bottom of the tail race. The adjustment of the openings between the upper and lower edges of the guides and buckets, the angles that the upper ends of the guides and the lower ends of the buckets make with a horizontal plane, and also the angle formed by the lower ends of guides and the upper ends of the buckets, and also the shape of the curve of both guides and buckets, are particular points about this system, depending upon principles, governing similar points in the Fourneyron system. The method, not used in the Fourneyron system, of suspending the moving wheel in the cylinder, above the surface of the water in the tail race, renders the wheel easy of repair in case of accidents, as all the principal parts are made accessible by merely shutting off the water in the head race. Suspending the wheels between the two levels of water, does not in the slightest degree take from its efficiency in power or speed, because the air-tight cylinder in which the wheel revolves, being carried down below the surface of the water in the tail race, gives to the wheel, in its suspended position, the same power and speed as if it were placed at the bottom of the fall. The principle which produces this effect is rather difficult to explain, but an idea of its truth, and the manner in which it is produced, may be obtained by any one who will make the following experiment: In a tub or reservoir, containing a large quantity of water, place a bucket, and after filling it, so that it will sink below the surface of the water in the tub, invert the bucket, and try to raise it from the water perpendicularly, bottom upwards. It will be found that the water will remain in the bucket, and exert a force tending to draw the bucket downward. This same force is exerted upon the water passing through the moving wheel of a Jonval Turbine, contained in an air-tight cylinder—the column of water in the cylinder below the wheel drawing the water through the wheel with the same velocity as if the wheel were placed at the bottom of the fall, and was acted upon by a column of water of the same height, acting entirely from above.

In addition to the advantages of having all the working parts of the wheel easily accessible, by having the moving wheel and the step placed above the surface of water in the tail race, are those gained from water flowing on the wheel perpendicularly, and, therefore, not so much changed in direction as in the Fourneyron system. Also, the very important matter of the guides being held in the conical portion of the cylinder only by the pressure of the water upon them, and not being bolted fast. By this arrangement, if accidentally a stone or any other material, is caught between the guides and the buckets of the moving wheel, the guides are raised and carried around in the conical part of the cylinder, and neither the guides or buckets are liable to be broken, but which with wheels having the guides fastened rigidly is almost sure to happen when such accidents occur.

In both the Fourneyron and the Jonval, and in fact almost all systems of Turbines, a cast-iron reservoir above the wheel is often substituted for the wooden forebay—sometimes covered on top, and having the water brought into it by either a cast or wrought-iron, or wooden pipe, or through a mason-work flume—the Turbine shaft projecting through the top of the reservoir, and surrounded by a stuffing bore, packed so as to prevent the escape of water at this place.

The Jonval system was introduced into this country about the year 1848, by M. Emile Geyelin, who has erected quite a large number in the United States, Canada, West Indies, Mexico, and South America, having them principally constructed in this neighborhood. These wheels have varied from 200 to 4 or 5 horse power, and are driven by water-falls varying from 2 to 160 feet. A wheel erected near Saltillo, in Mexico, is interesting from the power produced by an apparently small and delicate machine. The fall is 160 feet, the two moving wheels of the double wheel, (two wheels placed on a horizontal shaft,) which give motion to the machinery of the cotton mill which they drive, are each only 11 inches diameter, and the power produced by them is 125 horse-power. The Turbine now working so well at Fairmount, is also of this system, and was erected under the direction of Mr. Geyelin, in 1851. The contract for the three new wheels required for driving the six new pumps about being placed in the new mill house at Fairmount has been awarded to Mr. Geyelin, after a patient investigation by the Chief Engineer and the Watering Committee of Councils into the merits of several varieties of Turbines submitted by various competitors for the work.

These three wheels are now considerably advanced towards completion, and they will be, when erected, among the most powerful and largest ever constructed.

Their principal dimensions are as follows: the moving wheels are each 9 feet diameter, having 50 buckets; radical length of buckets 16 inches, depth of rim 12 inches. Each stationary or guide wheel contains 17 guides, depth of rim 19 inches. The cylinder surrounding each wheel is 9 feet 6 inches diameter at the increased portion below the moving wheel, and it is 7 feet 2 inches long. The moving wheels are placed in their cylinders at a height of about three feet above the surface of the water in the tail race at low tide. The circular cast-iron gates sliding on the lower part of each cylinder, are ten feet three inches diameter, and 30 inches high; they rest on base rings of cast-iron, placed at the bottom of the tail race, when the flow of water through the wheel is stopped. Above each cylinder is placed, in lieu of the forebay, a large cast-iron reservoir, twelve feet diameter, with an opening at one side of elliptical form. Each chamber or reservoir is covered by a cast-iron cover, strengthed by ribs, and is thus made to carry the upper bearing of the Turbine shaft and the first bearing of the counter shaft.

The water is brought from the dam to each reservoir by a wrought-iron flume of the same section as the opening at the side of the reservoir. The transverse diameter being 12 ft. 10 inches, and the conjugate 7 feet 2 inches. The gearing for conveying the motion and power produced by the wheels to the pumps, is also of a massive character, the center shafts being 12 inches diameter, and the crank shaft 16 inches diameter at their ends, and 18 inches diameter at their middle. The fall at Fairmount varies with the different states of the tide in the river, from 6 to 14 feet. Each Turbine is, however, rated at 100 horse power, with a fall of 8 feet. A portion of the above-described machinery is in its place at Fairmount, and the remaining portions are nearly completed.—*Phila. Ledger.*

WOODEN TRAYS FOR GAS PURIFIERS.—Dr. Antisell, Examiner, has decided between the interfering applications of Richard G. Hunt and of William Combe, assignor to Nathaniel O. Hawkeshurst, for slotted solid wood sieves for gas purifiers. As will be seen from the following extract from the Examiner's opinion, the decision is in favor of Mr. Hunt:

"I think that Hunt has proved inventorship of the cutter for making the slots, and is fairly entitled to whatever results from the use of said tool, and is therefore entitled to the shape of the extremities of the slots produced by the action of the cutter, and a patent with a modified claim to such improvement in conical slotted frames may be issued to him; and the application of William Combe is rejected."

OPENING THE BRITISH MUSEUM TO THE PUBLIC BY GAS-LIGHT.

To the great masses of our working population, this Institution, on which millions have been expended, and which is kept up by a large national expenditure, is at present far too little available as a place of recreation and instruction. On the few holidays which occur at Christmas, Easter, and Whitsuntide, we see crowds of workingmen and their families, gladly availing themselves of these rare opportunities, and no doubt some good is effected by those visits; but in these days of advanced intelligence, the British Museum should be devoted during seasonable hours, to the uses of the many thousands of young men and others who are using earnest endeavors for their advancement and improvement. To many of these the opening of this collection in the evenings, up till say ten o'clock, would be a very great advantage: besides this, to the public generally, it would afford an opportunity of viewing the rare treasures and curiosities which have been gathered here at so much labor and cost. For these, and other important reasons, therefore we regret that the trustees have resolved that they would not be justified in allowing the collections of the Museum to be opened at any hour which would require gas-light.

Upon first considering the resolution which has been come to by the trustees, most persons will experience astonishment and some alarm at the late Mr. Braidwood's account of the inflammable nature of a building which has been erected by so large an outlay in our own days. By that gentleman's report, this museum—which contains priceless treasures of the world's art, objects, which, if destroyed, could never be replaced; the rare manuscripts, the chronicles of history, and the stories of old and new world learning, the real value of which cannot be estimated by any standard of price; the records of the famed cities of antiquity, whose glories have for centuries been laid in the dust; the relics of dynasties which have passed away; and examples of the arts of many ages, which are so useful to the historian and artist; the collection of objects of natural history; the store of prints, drawings, &c.—is, if it would be exposed to danger from gas-lighting, at any time liable, even at present, to risk from neglect, accident, or a spirit of mischief. These are uncomfortable reflections, and cause persons to inquire how it has occurred that a building intended for such purposes, has not been so constructed as to be perfectly safe from the danger of fire. At the present time there are steam-works and fires below for the purpose of heating and ventilating the new reading room, print room, &c.: there are also fire stoves in the manuscript and other departments, and in the private rooms of the officers. We mention this for the purpose of suggesting that if the shadow of risk exists of the burning of the contents of the Museum, no time should be lost in making those alterations which will prevent gas-light, or any other kind of light, from doing damage. The floorings, such as that of the King's library, the bookcases, staircases, (if any such exist,) rafters, or other inflammable parts of the structure, should without delay be removed, and others of a more safe description substituted.

While acknowledging the great experience of Mr. Braidwood, in connection with fires, we cannot admit that any great extra amount of danger would result from the lighting of the British Museum with gas, provided that this is carefully and properly managed; and, in fact, unless the electric light should became available, by means of the experiments which are constantly being carried on by men of science in various parts of the world,—without the use of gas, the British Museum will not became a means of enlightenment to the artizans and numerons other classes of the metropolis who cannot spare the working hours for the purpose of pursuing those studies which would advance them in skill and intelligence.

At the Kensington Museum, gas-lighting is used with safety and good effect.

It will be impossible to oppose for much longer the strong voice of public opinion on this subject: the intelligence of the people is rapidly improving; and means must be taken to render such establishments as the British Museum accessible at hours convenient to the industrious classes of London.—*London Builder.*

FOREIGN NEWS.

RECENT ENGLISH PATENTS.

A patent in England has been granted to L. C. E. Vial, of Paris, France, for the "*Manufacture of coloring matters and pigments from coal-oil, raw naphthaline, and from the waste lime from Gas-Works.*"

The inventor of this process takes coal-oil, or raw naphthaline, and treats it with an alkali or alkaline earth, such as potash, soda, or lime, under the influence of atmospheric air, by which a red coloring matter is formed of a greater or less depth of hue. The coloring matter may be used in this state, or it may be separated from the materials with which it is mixed, by treatment with a suitable alkaline solution—sub-carbonate of soda being preferred, and precipitating the coloring matter therefrom by any suitable acid, as sulphuric or acetic acid. For obtaining a green or bluish coloring matter, waste lime from the purifiers of gas-works is treated with a suitable acid—nitric or hydrochloric may be used—by which means a precipitate of a greenish or bluish color is obtained, which may be used in that state, or purified and washed by any suitable means.

W. M. Williams, of Handsworth, Staffordshire, has obtained a patent for "*An improvement or improvements in treating coal and other bituminous minerals, and peat, for the purpose of obtaining solid and liquid hydrocarbons therefrom.*" In this invention coal or other bituminous minerals, or peat, are subjected to a red heat under the pressure exerted by the elasticity of gases generated in a distillatory apparatus, by which treatment the volatile portion of the substance so operated upon, is mainly converted into paraffine, paraffine oil, and other solid and liquid hydrocarbons.

Besides these hydrocarbons there is always a quantity of permanent gas produced; but by the application of pressure in the distillatory apparatus, the quantity of the gas is diminished, and the amount of solid and liquid hydrocarbons increased.

The distillatory apparatus may be made of either cast or wrought iron—the latter being preferred. It consists of two vessels—a retort and a receiver, connected together by a pipe. The retort is set in a furnace, while the receiver is placed in water or otherwise cooled. There is an opening in the retort, through which the raw material is introduced, and the residuum removed. The receiver also has an opening for the removal of the products. These openings have covers which can be hermetically closed. At some part of the apparatus—preferably in the receiver—is a safety valve for permitting the escape of the gaseous matter when the pressure of the gas reaches the desired point.

The retort being charged, the openings in the apparatus are securely closed, except the safety valve, which is loaded to the pressure which is wished to be maintained. The retort is then rapidly raised to a red heat, and kept at that temperature until volatile products cease to come off. The gaseous matter first collects in the receiver, and by the pressure it exerts in the apparatus, determines the amount of solid and liquid hydrocarbons, which is much greater than would be obtained under the normal pressure of the atmosphere. The products may be purified in the usual manner. The excess of permanent gas escapes at the safety valve, or by a stop-cock.

In this process, it is preferred to distil the coal, or other bituminous mineral, or peat, at a higher temperature than would be employed for the distillation under the ordinary atmospheric pressure. It is also preferred to vary the pressure employed, according to the temperature to which the retorts are raised; that is, increasing the pressure as the temperature increases, and *vice versa*. This adjustment of the pressure is regulated by a small aperture created by partially closing a stop-cock fixed on any convenient part of the distillatory apparatus. The stop-cock is closed so far that the gas evolved at a full red heat shall not be able to escape through it, unless it passes out with the velocity acquired by a pressure equal to about 20 atmospheres, or 300 lbs. to the square inch. Any increase of temperature is attended by an increased evolution of gas, and a consequent increase of pressure, and any diminution of temperature is attended with a decrease of pressure. The safety-valve limits the maximum pressure, and serves as a gauge whereby the opening of the stop-cock can be regulated at any given temperature. In some cases the unavoidable leakage of the apparatus permits a sufficient escape of gas to bring the pressure down to the required amount, in which case the stop-cock is closed.

The patentee does not limit himself to the use of any particular degree of temperature or pressure, but always uses a higher temperature than can be advantageously employed where no pressure is applied. He prefers to make his retorts in the form of upright cylinders, and to conduct the products of distillation from the retorts by means of side pipes opening into the retorts near the top. The retorts are charged at their open ends by means of open canisters, made of sheet-iron, and of such a form and size that they nearly fill the interior of the retort. The canisters are filled with coal, or other bituminous mineral, broken into small pieces, and may be put into the retorts while they are hot. After the introduction of the canisters, the lids of the retorts are fastened down and the distillation immediately proceeds.

By the use of these canisters, the process may be made almost continuous, one canister being removed when its contents have been sufficiently operated upon, and replaced by a freshly-charged one with little loss of time. By the use of these canisters much time is saved in charging the retorts, and they are likewise prevented from cooling. When the distillation is effected under pressure, according to this invention, the gradual heating of the coal, or other bituminous matter which is employed when the process is employed without pressure, is unnecessary.

The claim is for the improvement or improvements in treating coal and other bituminous minerals and peat for the purpose of obtaining solid and liquid hydrocarbons therefrom, as hereinbefore described, that is to say, subjecting coal and other bituminous minerals and peat, to destructive distillation, under the pressure exerted by the elasticity of the gases generated in the distillatory apparatus, whereby the proportion of incondensible gaseous hydrocarbons, is diminished, and the proportion of paraffine, paraffine oil, and other solid and liquid hydrocarbons is increased, compared with the products obtained when no pressure beyond that of the atmosphere is employed.

Flowing Oil Well.—On August 9th a flowing well was opened by Kier & Donnell, on G. W. McClintock's farm, Oil Creek. When the vein was opened it flowed with immense force, throwing a stream of oil, the full size of the pipe, sixty or seventy feet into the air. Large quantities poured down into the creek. At various places below, individuals threw out booms into the creek, and so stopping the oil, collected in in various amounts of from five to sixty barrels. As soon as practicable, tubing with a seed bag was inserted into the pipe of the well, to conduct the oil into a tank by the old pumping well. The upward pressure was so great as to render it difficult to set the tubing down to its place. Here were secured about two hundred and ninety-five barrels of oil from between five and six o'clock P. M. to seven o'clock the next morning, considerable quantities flowing away at the same time. The day after the well was opened the oil was flowing from it faster than two men could barrel it.—*Pittsburg Post.*

Oil in Pittsburg.—We are not at liberty to mention names of parties, but we can state that oil has been discovered in at least two localities within the city limits. In one case two and a half barrels were dipped in a single day from a pool dug in the Fifth Ward, and in the Second Ward nearly a barrel has been taken from the surface of an old well in a cellar. If these places were bored in and tested, oil in large quantities might be obtained.—*Pittsburg Post.*

Explosion in the Gas-Works in Brooklyn, N. Y.—About 1 o'clock on the morning of August 19, an explosion occurred in the valve-house, attached to the Brooklyn gas-works, on the corner of Plymouth and Gold streets, the force of which tore up one of the floors and the roof, causing damage to the amount of $300. It is supposed to have been caused by a defect in one of the valves.

PATENTS.

UNITED STATES.

1,804.—C. C. Coe (assignor to himself and G. S. Cottman), of Rome, N. Y., for an Improvement in Vapor Lamps:

First, I claim in combination with the pervious cylinder and wick tube the gas generating pan or cup, substantially as described and for the purpose set forth.

Second, I claim combining with the gas generating from the pervious cylinder, burner, outer casing fender and passage ways, substantially as described and for the purposes set forth.

Third, I claim combining with the wick tube and cup the valve, n, substantially as and for the purpose described.

1,811.—Benj. Arnold, of East Greenwich, R. I., for an Improvement in Filters:

I claim the arrangement of the elastic bulb, A, with the valves, a b, filter, C, and tubes, B D, substantially as described and for the purpose set forth.

1,827.—M. T. Greenleaf, of Quincy, Ill., for an Improvement in Pumps:

I claim the cylinder, A, formed of two parts, a b, of different diameters, in combination with the piston, B', tubular piston, G, check-valves, F c, and receiving-valve, d, with or without the check-valve, E, and suction-pipe, D, for the purpose specified.

[The invention consists in the employment, or use, of a hollow piston-rod, in connection with two pistons, air and water chambers, receiving and check-valves, whereby a simple and efficient suction and force pump is obtained.]

1,843.—J. C. Wright, of Minersville, Pa., for an Improvement in Lamps:

I claim, first, The combination of the concentric conical deflectors, C and D, and sliding wick tube E', all constructed, arranged, and operated in the manner and for the purposes shown and explained.

Second, The movable cap, H, constructed with a supporting collar, h, vertical segmental flange, h', and oblique convex-ended deflector, h2, and used in combination with the slotted conical deflector, C, in the manner and for the purposes shown and explained.

1,858.—A. H. French, of Pittsfield, Ill., for an Improvement in Water Elevators:

I claim constructing the well buckets with hinged valves d d', in their bottoms and hooks, g g, on their sides, and combining with said buckets the hinged or swinging troughs, G G', furnished with bails, h h', and lifting pins, k k', all arranged and operating substantially as and for the purposes set forth.

[This invention relates to an improvement in filling and discharging water from well buckets whereby the water is automatically discharged from the buckets when they are drawn up to the desired height and emptied into a main receiving trough.]

1,867.—R. G. Hunt, of New York City, for an Improved Machine for Slotting Gas Sieves:

I claim the pyramidically toothed cutter with cutting edges alternately on opposite sides of the teeth, substantially as described, in combination with a yielding hinged bed or table, substantially as described.

Also, I claim the hinged bed, in combination with a spring or equivalent, substantially as described.

1,874.—G. Kober, of New York City, for an Improvement in Water Meters:

I claim the downward extension of the spiral blades, k k, from the exterior periphery of the rising and falling cylindrical hub, d, below the bottom thereof, as shown at i i, in combination with an annular seat, j j, of smaller diameter than the said hub, substantially as and for the purpose set forth.

1,877.—D. W. Lavis, of Janesville, Wis., for an Improvement in Pumps:

I claim, first, The peculiar combination of the piston, L, and piston-barrel, E, with the equalizing bar or lever-gauge, G, and the balancing rods, P O, substantially as and for the purpose set forth and described.

Second, The oscillating fulcrum bar, R, combined with the lever or handle, S, and the balancing rods, P O, and the movable case, C, substantially as shown and described.

1,881.—S. M. Mott, of Wellsville, N. Y., for an Improvement in the Manufacture of Lubricating Oils:

I claim the within described method of preparing lubricating oil from crude rock or mineral oil by subjecting it to the action of steam, combined with the chemicals within described in the manner set forth.

1,884.—Edwin Parks, of Winchendon, Mass., for an Improvement in Faucets:

I claim the bit, c, in combination with the chamber, d, as applied to a faucet for the purpose described.

1,885.—William Pitt, of Ithaca, N. Y., for an Improvement in Lamps:

I claim the supplemental wick tubes, F G, applied to the wick tube, B, as shown, in combination with the flame-divider, H, attached to the cone or deflector, E, relatively with the tube, F, as shown, and all arranged as and for the purpose set forth.

[The object of this invention is to obtain a lamp for burning coal oil, with a good illuminating flame, without the usual glass chimney. The invention consists in the employment or use of supplemental wick tubes applied to the wick tube proper, and used in connection with a flame-divider applied to the cone or deflector. All being arranged to effect the desired end.]

1,902.—Joseph Thomas, of New York City, for an Improvement in Lamps:

I claim supporting the heating and deflecting piece F G, upon the casing, J, which latter is interposed between the heating and deflecting piece, F G, and the wick tube, C, and so arranged as to retard the transmission of heat to the latter, substantially as set forth.

I also claim, in connection with the above, allowing a portion of the air which passes between the heating and deflecting plates, F G, to first pass between the casing, J, and the wick tube, C, substantially as and for the purpose set forth.

1,914.—L. J. Worden and A. Leach (assignors to themselves and D. S. Heffron), of Utica, N. Y., for an Improvement in Lamps:

We claim the combination of the concentric annular passages, e, and the air chamber, d, and perforated shell, D, all constructed and arranged as shown and described, and operating to protect the flame from lateral currents of air and equalize the draft, as explained.

[The object of this invention is to obtain a lamp for burning coal oil in railroad cars, and other places where lamps are subjected to a jostling or vibratory movement.]

1,926.—U. B. Vidal, of Philadelphia, Pa., for an Improvement in Lamps:

I claim the handle, H, corrugated or roughened bottom, e, expended wick top F', and sliding tube, D, with flame spreader, F, attached, all being arranged as shown, to form a new article of manufacture, for the purpose specified.

[The object of this invention is to prevent the danger attending the use of portable or hand lamps, in which volatile hydro-carbons are burned for illuminating purposes. The invention also has for its object the ready volatilizing of the fluid, and a free supply of gas to the illuminating flame.]

1,947.—Joshua Merrill, of Boston, Mass., for an Improvement in Casing of Stills:

First, I claim encasing a still, substantially in the manner described, so as to surround the sides of the still with a confined air-space or chamber, substantially for the purposes set forth.

Second, I claim making a portion of the casing removable, for the purpose of facilitating the removal and replacement of stills requiring repair, substantially as described.

Third, I claim combining with the casing openings and dampers, or covers, for the admission and control of air circulation about the sides of the still, substantially as described.

1,961.—G. E. C Delaire, of Paris, France, for an Improvement in Aniline Colors:

I claim the method described of converting the red of aniline into the blue and violet of aniline, by treating the former with pure aniline, in the manner substantially as set forth.

1,992.—H. Houpt and J. K. Griffith, of Reading, Pa., for an Improved Measuring Faucet:

We claim the application of the circular cut-off valve V, recessed in the bottom of piston for the purpose described.

2,003.—Joseph Rider, of Newark, Ohio, for an Improvement in Water Elevators:

I claim the use of the hinged partition, p, in connection with the buckets, m m, the notched swinging doors, l l, the curved valve rods, s r, and the valves, s s, substantially in the manner and for the purpose set forth.

2,004.—Albert Russell, of Newburyport, Mass., for an Improvement in Pumps:

I claim my improved pump, as constructed with the auxiliary induction pipe, F, and the air chamber or vessel, G, arranged relatively to each other, to the lower box or valve, and to the main induction pipe, E, as specified.

REPORT OF SANITARY COMMISSION ON BARRACKS AND HOSPITALS.—The report gives a large amount of interesting information on the construction and economy of barracks and army hospitals. It shows clearly why so many men used to go into hospital, and why so few comparatively come out of hospital—alive. The total number of barracks, to which the inquiry of the new commission referred, amounts to 243, and of hospitals to 167, distributed throughout the United Kingdom in the following proportions:

	Barracks.	Hospitals.
England	117	76
Scotland	20	15
Ireland	106	76

Of these the commissioners have personally examined and reported for improvement, up to the present time, 162 barracks and 114 hospitals. They have examined the camps at Shornecliffe and Colchester, and have also made a partial inspection of the camp at Aldershott, but have not yet reported on them in detail. With reference to the instruction that they should see that 600 cubic feet were set apart for every man in barracks, they found that at present it would be impossible to carry out literally this instruction. They had no idea, until they examined the barrack-rooms personally, of the amount of overcrowding, beyond the requirement of 600 cubic feet per man, which existed. Formerly, it was even very much greater than it is at present. As 600 cubic feet per man must now be considered as the space to be allotted in all permanent barracks in temperate climates, there is a very considerable deficiency in barrack accommodation. Indeed, it would be necessary to add about a third part to the permanent barrack buildings of the United Kingdom to enable 600 cubic feet per man to be given. In an earlier volume we gave accounts of the condition of some of the metropolitan barracks, the Wellington, the Portman street, and others, which are fully borne out by the report. When they come to speak of hospital construction, they adopt at once the Pavilion plan, and enforce the principle, as all-important, of having windows on both sides of each ward. Strong as the reasons are for allotting a certain amount of space in barrack-rooms, the necessity is greater as regards hospital wards.—*Builder.*

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POTTS' REVOLVING SIGNAL LIGHTS,

PATENTED SEPTEMBER 8, 1857.

Mr. ALBERT POTTS, the well known Inventor of the LAMP-POST LETTER-BOXES, which have been adopted by the Post-Office Department for the large cities of the United States—and also of the GAS METER BOX, to be set in the front walls of houses, thus doing away with visits from Gas Inspectors, or burglars in gas-clothing, has lately brought forward a third Invention, which in point of importance and world-wide usefulness, surpasses the others entirely.

These SIGNAL LIGHTS are intended for use on Vessels propelled by Steam, and those exclusively. They specially indicate the presence of a Steamer, and by their use, there will be less likelihood of mistakes, and consequent collision than at present. They are also intended for SIGNALLING AT NIGHT, and can be used for that purpose UNDER ANY CODE of SIGNALS NOW ARRANGED FOR FLAGS.

This Improvement in Lights for Steam Vessels, consists in having the Lanterns containing the colored lights, connected by means of a series of cogged gearing with some convenient part of the Engine or Machinery, so as to cause them to have a revolving motion around their axis. On side wheel steamers, the Lanterns should be placed directly over the wheel-houses, and the power, or motion to turn them, may then be very conveniently obtained from the paddle wheel shaft. On Propellers, the Lanterns should be placed on each side of the Pilot House, or hurricane deck, and the rotary motion derived from any convenient or suitable part of the Engine or Propeller Shaft. Each Lantern is supported on the end of movable cranes, so that their relative positions may be changed and properly adjusted to suit the view of observers on either side of the vessel at the time of signalling.

The Lanterns to be used in this improvement may be constructed for Burning Oils, Fluids, Gas, or any of the known modes of illumination, and should be furnished with one or more lenses and reflectors, so as to concentrate the rays of light, and project them over the horizon with the greatest intensity. The lenses for this purpose should be made with colored glass, viz., Red and Green, and the position of the respective Lanterns, according to the color of the lenses therein, must be placed on the sides of the vessel so as to answer to the requirements of Rules and Regulations made and published by the Supervising Inspectors of Steamboats, agreeably to the Act of Congress of the United States in such cases made and provided. That is to say—by said Regulation—the Lantern having the green lenses for producing the Green Colored Light, must be placed on the starboard side of the vessel, and the other Lantern producing the Red Light, to be placed on the port side thereof in pursuance, also, of the aforesaid Rules and Regulations, there is to be found in board and behind each Lantern, a screen to answer the purposes therein mentioned.

The cogged gearing, by which the Lanterns are connected with the Engine or paddle wheel shaft, and thereby caused to revolve when the Engine is in motion, is so arranged that the connection may be readily shipped or unshipped, and the lanterns made stationary or otherwise, at the pleasure of the Pilot, or those whose duty it may be to operate and attend to the same. The cranes on which the Lanterns are placed, are also rigged so as to be readily turned horizontally from one position to another, so as to present one or both lights to the view of observers when laying athwart ships at the time of signalling.

On the Use and Application of the Improvement for Night Signals.

When the vessel is under weigh, or going ahead in its course, the Lanterns are to be placed directly athwart ships, so that such colored light therein will then have the position and place prescribed by Rule Seventh of the aforesaid Supervising Inspectors of Steam Boats, and with the screens behind them, as above described, will then answer all the intents and purposes for which the colored lights are thus required to be used, as illustrated in the several diagrams published by said Inspectors for the working of a system of Colored Lights. The Lights in this case, according to the color seen by the observer, indicate the course or direction of the vessel whereon they are carried When the Lanterns with the colored lights therein, are made to revolve around on their axis, as proposed in this improvement, in addition to the signal above, another, and as we believe, very important and useful signal is thus formed, indicating that the vessel, whereon it is carried is a Steamer. In dark foggy nights, it is found by experience, to be somewhat of a difficult task to distinguish sailing vessels from Steamers and Propellers, especially when the latter are rigged, and carry a press of sail. When Steamers meet "head and head," it is the duty of each to pass to the right, or, on the larboard side of the other. Whereas, when a Steamer meets a sailing vessel, the former must give way and allow the latter to pursue its course. Hence, to carry out the regulations of the said Steamboat Inspectors, and prevent collisions, it is important to have some infallible sign, whereby the character of the vessel may be readily seen and determined. Several very fatal collisions have recently taken place through mistakes of this kind.

On Signals for Speed and Distance.

The gearing of the Lanterns with the paddle wheel or propeller shaft, may be so arranged as to be an index of their speed A very good proportion, would probably be to make the Laterns turn about one third as fast as said shaft. Hence, when the speed of the vessel is previously known, when making a certain number of revolutions of the paddle or propeller, it becomes an easy task from observing the time with which the Lanterns thereon may be turning to approximate to the speed with which the said vessel is moving at the time of observation. Again, as the arcs described by the rays of light from each lantern, as they revolve around on their axis, is greater in proportion to the distance from said lantern, so will the time in which said rays move over any given space, be less in the same proportion. Hence, when the lights are very remote, or far off, from the observer, the duration of each column or cylinder, of rays from each lense, would pass the eye of the observer, in a short space of time, or with great velocity. Whereas, at a nearer point of observation, the time of its passage would be considerably lengthened, or the motion thereof apparently much slower. From these facts, we believe the improvement is susceptible of indicating, in an approximate manner, the speed and distance of vessels whereon the revolving lights may be used.

On the Application of the Improvement for Marine Telegraphic Purposes.

The Revolving Lights can be readily applied to the general purposes of Marine Signalling at night, as follows: In order to show this application, we have adopted the Numbers as given in Roger's Code of Marine Day Signals, believing that work to be somewhat of a standard in matters of this kind. Instead of the flags used in the above code, for day signals, to indicate the combinations of two or more letters of the Alphabet, which combination is referable to certain numbers indicative of the words or sentences telegraphed, we propose to perform the same operation, at night, by means of the two revolving colored lights, so as to indicate the numbers directly to which the intended words or sentences to be telegraphed are referable. Thus, whether the vessel to be signalled is ahead, astern, or abaft the beam, the position of the two colored lights must be so adjusted, by means of the moveable cranes, whereon said lanterns or lights are fixed, that the two lights may be fully made visible to the observer. When both lights are thrown into this position, stopping the motion of the lanterns may be the signal for calling attention, or a rocket fired off, or the steam whistle blown, would answer the same purpose. Now, in order to represent the ten numerals, we propose to indicate them by the respective motions of the two colored lights, as follows:

RED LIGHT.				GREEN LIGHT.			
One Red, Represents Number			**1.**	**Two Green, Represents Number**			**2.**
Three	**do.**	**do.**	**do. 3.**	**Four**	**do.**	**do.**	**do. 4.**
Five	**do.**	**do.**	**do. 5.**	**Six**	**do.**	**do**	**do. 6.**
Seven	**do.**	**do.**	**do. 7.**	**Eight**	**do.**	**do.**	**do. 8.**
Nine	**do.**	**do.**	**do. 9.**	**One**	**do.**	**do.**	**do. 0.**

In the above arrangement, it will be seen that all the odd numbers are made by the Red Light, and the even numbers by the Green Light. In order to indicate the repeat of the last number, once or more times, or for other special purposes, which may hereafter be found useful and necessary, an even number of lights may be shown by the Red, and an odd number by the Green. It will be understood that when the Lanterns are made with three lenses in them, the numerals as above arranged are formed by the number of times a new light or lense is presented to the observer. Thus to indicate the number 3, the Red Light or Lantern would make one entire revolution; and to make the number 6, the Lantern carrying the Green Light would make two revolutions, and so on with the other numbers. When a symbol is made, the motion of the Lantern is to be suspended for a short time, and when a number expressing a sentence is formed, the lantern may be stopped for a longer period, or some one of the special signals above referred to, may be used for this purpose.

To show the application of this improvement as above mentioned, whereby these Lights can be used as readily for Night Signals, as Flags are used for Day Signals by the author of Roger's Code, we shall use the sign O colored red or green, according to the light used, to show the number of movements performed by the respective lights in order to represent any desired number of said code, suitable for the required purpose.

RED LIGHT.	GREEN LIGHT.
O, O, O, O, O,	
O, O, O, O, O, O, O.	
	O, O.
	O. O.

The above would represent the number 5722, and by reference to said Roger's Code, would be found to stand before the sentence:
"WILL YOU SHOW THE NUMBER THAT REPRESENTS YOUR NAME?"

RED LIGHT.	GREEN LIGHT.
O.	
O, O, O, O, O.	
O, O, O, O, O, O, O.	
	O, O.

Here the number expressed is 1572, and per the same Code, stands for
"WHERE ARE YOU BOUND?"

RED LIGHT.	GREEN LIGHT.
O.	
O, O, O, O, O, O, O, O, O.	
	O, O, O, O, O, O, O, O.

The number thus expressed is 1928, and per said Code is
"WHAT IS YOUR CARGO?"

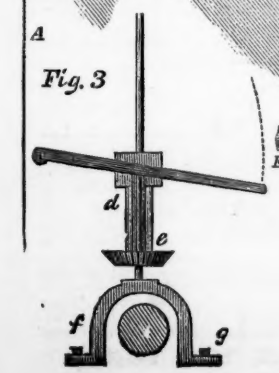
RED LIGHT.	GREEN LIGHT.
O, O, O, O, O.	
	O, O, O, O, O, O.
	O.
O, O, O.	

Here the number expressed is 5603, and stands for
"HAVE YOU ANY NEWS?"

(RED LIGHT.)

Fig. 2

Fig. 3



(GREEN LIGHT)

Fig. 1

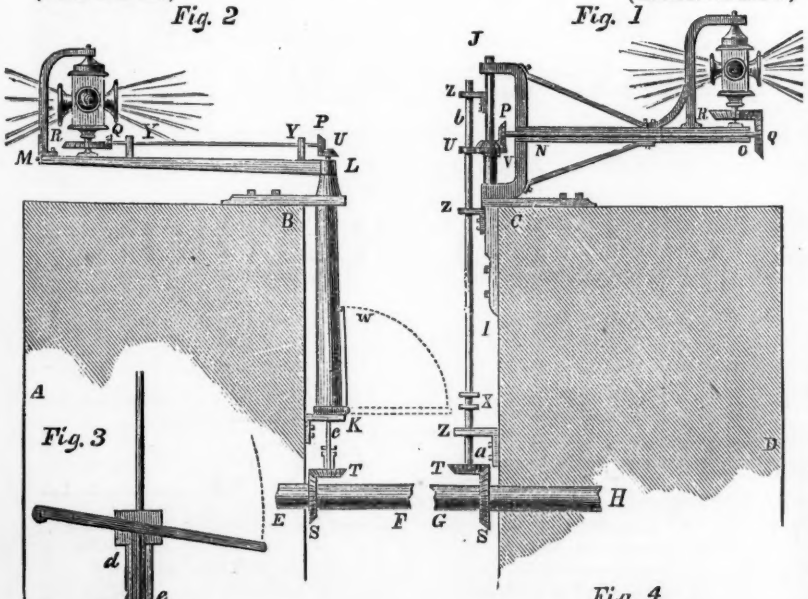
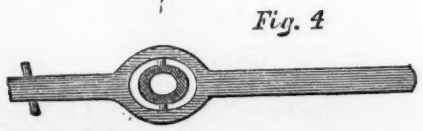


Fig. 4



MECHANICAL CONSTRUCTION.

In our engravings, Figs. 1 and 2, represent Vertical Sections through the wheel-house. In them E F and G H represent portions of the main Shaft. In Fig. 1, I J is a stout Iron or Wooden post, fastened against the side of the wheel-house, directly over the main shaft On the upper part of this post, is fitted the moveable arm or crane N O, to the main shaft is fitted the bevel wheel S, and to the lower end of the rod a b, is fitted a corresponding wheel T. U is a small pinion on a b, which gears with the spur wheel, V, which in turns gives motion to the wheels, P and Q, and so revolves the lamp R. It will be seen that a Rotary motion is given to the lamp, when the main shaft is in motion and a b connected.

It can be disconnected by a lever, acting between the bosses X, which will elevate the rod in the guides Z Z Z.

Fig. 2 is another arrangement, for the same purpose. In this, K L, represent a hollow Shaft, on which is firmly fastened, the arm L M, on which is the lantern. The hollow post is secured to the wheel-house by the straps K and B, and it can turn freely in them, the other part being the same in them as in fig. 1

The lever K W, when drawn down, will turn the frame in any required position around the Shaft c U. In fig. 1, the arm or crane N O, may be operated by cords from the wheel-house, but in this device, the rod c U. does not lift up as in fig. 1, but in its place, the lower end is made square, and on it slides the short tube, d E, shown in fig. 3. The lower end of the rod turns on a bridge, f g, spanning the main shaft. On the upper end of the tube, d e, a lever is attached by means of boxes and collars as shown in fig. 4. This lever when raised carries with it the beveled wheel T, thus disconnecting the gearing apparatus.

ALBERT POTTS, Patentee,
PHILADELPHIA, Pa.

THE

STERLING GAS-REGULATOR,

Improves the Light and Saves a Large Per Centage of Gas.

MANUFACTURED BY THE

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It is well known that Printers require the best and most brilliant light In proof of the superiority of these Machines over all others, the following New York establishments are using them, and testify to their excellence:—New York Times, New York Herald, New York World, New York Tribune, New York Sun, Journal of Commerce, Courier & Enquirer, Evening Post, The Zietung, Dispatch, Leader, Scientific American, Advertiser and Spectator, Independent, Daily News, Harper's Monthly and Weekly, Transcript, Mercury, Atlas, Life Illustrated, Albion, Spirit of the Times, AMERICAN GAS-LIGHT JOURNAL, Christian Enquirer, Churchman, Church Journal, Christian Advocate, Christian Ambassador, Christian Intelligencer, Observer, Sunday Times, Sunday Courier.

By order of the New York and Brooklyn Common Councils, these Regulators are now used in the City Halls, Police Stations, Markets, and other Public Buildings in both cities.

They are Warranted by the

WHEELER & WILSON SEWING-MACHINE CO.,

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To keep in order, and always maintain the pressurs of the Gas at the lowest point for a brilliant light and economical combustion. They are so constructed that *under no circumstances can the Mercury get into the Meters, or in any way injure them.*

WARREN'S PATENT WATER & ALARM GAUGE,

For Protecting the Flues and Preventing Steam-Boiler Explosions.

This is a reliable High and Low Water Detector, arranged so as to render it one of the best Water Gauges ever attached to a Steam-Boiler; always presenting before the Engineer at sight the exact height of the water, and if, by oversight or by sudden leakage, the water gets low in the boiler, it will cause an alarm before the water gets below the flues, thereby preventing an explosion. This Gauge can be made to alarm at any point desired as a High Water Detector, thereby preventing the water from getting to that height as to be forced into the cylinder of the engine, often causing serious accidents. Thus it is a High as well as a Low water Detector. For sale by

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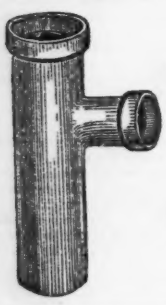
Where a Gauge is constantly in operation.



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PURE WATER & SOIL PIPE,

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All Goods Warranted.

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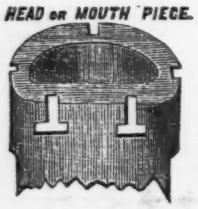
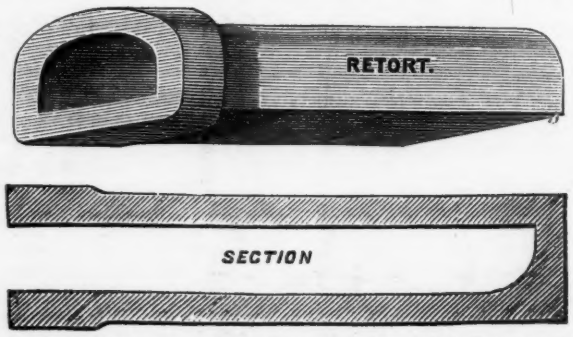
STOURBRIDGE, ENGLAND, FIRE-BRICK AND RETORT WORKS.





KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for Burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them

Free from Cracks and Correct in Form.

By great care in Manufacturing, combined with the advantages in Burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

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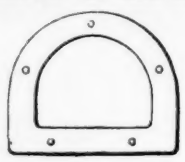
COWEN'S PATENT FIRE-CLAY RETORTS.



JOSEPH COWEN & CO.,

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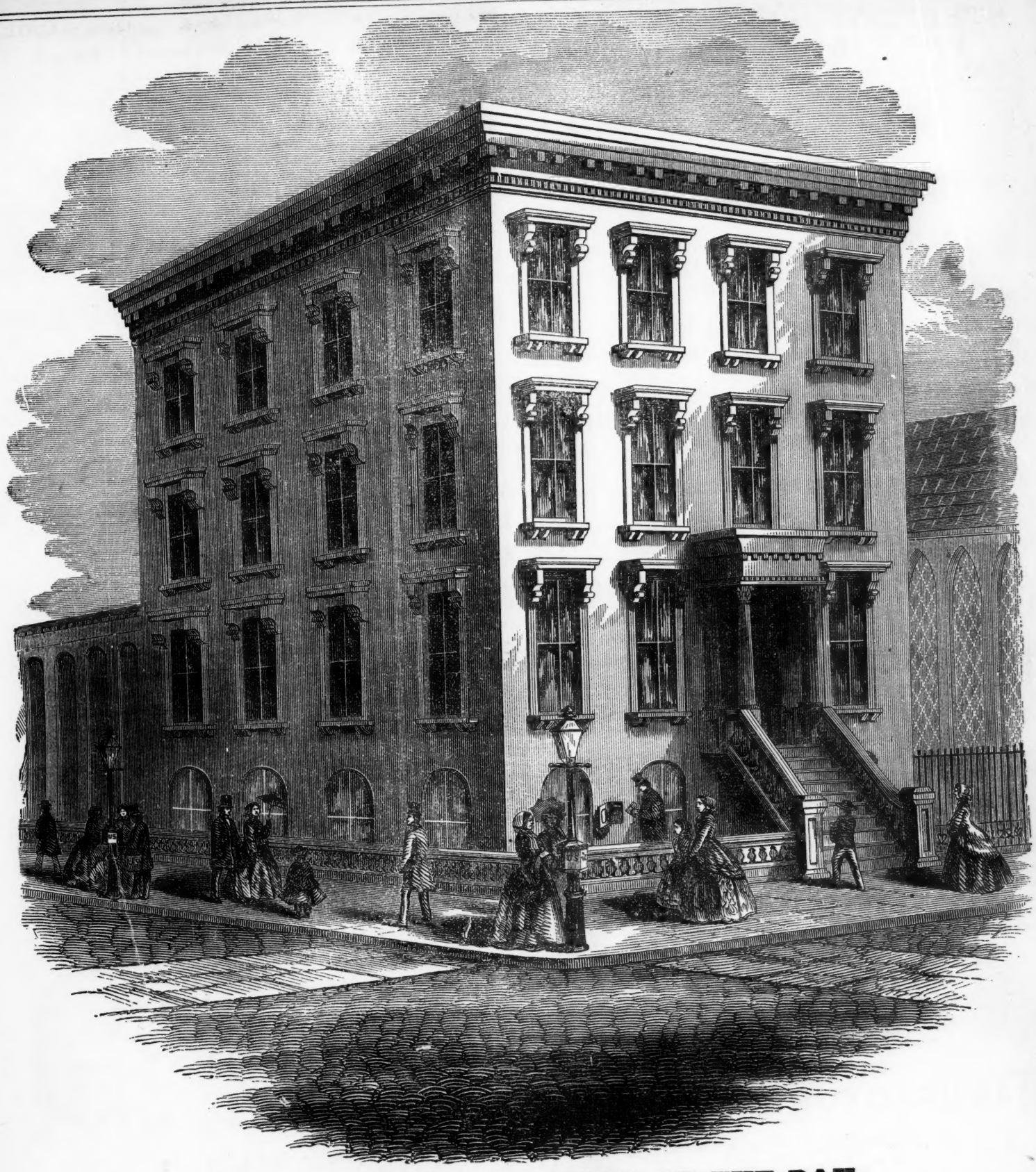

THE TWO GREAT PATENTS OF THE DAY.

1.—Improved Mode of Setting Gas-Meters in the Walls of Buildings.

2.—Cast-Iron Mail-Stations for Public Lamp-Posts.

Adopted by the UNITED STATES GOVERNMENT for the Principal Cities.

ALBERT POTTS, Philadelphia, Patentee.

By the FIRST IMPROVEMENT the Meters may be inspected at any time from without, by the agents of the Gas-Company having keys for that purpose. Thus burglars need no longer gain admittance to dwellings under pretense of examining the meters, while they, in fact, examine the fastenings. The meter-box, being neatly and securely imbedded in the front wall, the meter is protected against frost by means of a thick pad on the back of the door. It has been satisfactorily tested in long continued severe weather and found to be eminently successful.

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ALSO, BUNSEN'S PHOTOMETER, WITH COMPLETE APPARATUS FOR WORKING THE SAME

* The standard of measurement of this Gas-Holder is given by Professors Torrey, of the U. S. Assay Office; Joy, of Columbia College; Gibbs, of the Free Academy, and several other distinguished scientific gentlemen.

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The high reputation which we have enjoyed for more than twenty-two years, and the fact that we have manufactured a greater number of Gas-Meters than all other manufacturers in this country combined, must present itself as a security to parties desirous of securing the most reliable instruments. Having completed a most extensive addition to our Factory, and added many important improvements to our machinery, we are enabled to fill orders entrusted to us with despatch, and in all cases *guarantee entire satisfaction.* Our Patent Rotary-Valve Dry Gas-Meter is now used by upwards of Two Hundred Gas Companies, giving general satisfaction; we therefore recommend it, believing it superior to any other Dry Gas-Meter manufactured. All Meters tested separately by a sworn Meter-Inspector, and sealed when desired.

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